

# THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—27TH YEAR.

SYDNEY, SATURDAY, MARCH 23, 1940.

No. 12.

## Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

### ORIGINAL ARTICLES—

The Serological Response to Influenza Virus Infection during an Epidemic, with Particular Reference to Subclinical Infection, by F. M. BURNET, M.D., Ph.D., J. F. J. CADE, M.D., and DORA LUSH, M.Sc.	397
Industrial Eye Injuries, by D. R. GAWLER	401
Sternal Biopsy, by T. E. WILSON, M.D., B.Sc., M.R.A.C.P.	405
An Operation for Ankylosing the Knee Joint, by N. D. ROYLE, M.D., Ch.M., F.R.A.C.S.	410

### REPORTS OF CASES—

Congenital Absence of Pectoral Muscle, by DAVID B. ROSENTHAL, M.D., M.R.C.P.	411
Pneumococcal Septicæmia: Successful Treatment with "M & B 693", by A. R. SOUTHWOOD, M.D., and A. R. MAGABY	412

### REVIEWS—

Exercise	414
Trauma and New Growth	414

### NOTES ON BOOKS, CURRENT JOURNALS AND NEW APPLIANCES—

A Medical Dictionary	414
----------------------	-----

### LEADING ARTICLES—

The Meeting of the Federal Council	415
------------------------------------	-----

### CURRENT COMMENT—

Mycobacterial Infection of Wild Animals	416
An Honour for Dr. C. H. Kellaway	417

### THE SEROLOGICAL RESPONSE TO INFLUENZA VIRUS INFECTION DURING AN EPIDEMIC, WITH PARTICULAR REFERENCE TO SUBCLINICAL INFECTION.

By F. M. BURNET, M.D., Ph.D., J. F. J. CADE, M.D., and DORA LUSH, M.Sc.<sup>1</sup>

(From the Walter and Eliza Hall Institute, Melbourne.)

ALTHOUGH the virus aetiology of epidemic influenza is now fully established, the necessary technical methods of study have not been long enough available to provide anything approaching a complete picture of the epidemiology of influenza. Since epidemics cannot be predicted beforehand with any certainty, and last only a few weeks in any locality, it is difficult to arrange a comprehensive study of

<sup>1</sup> Work carried out under grants for research on virus diseases from the National Health and Medical Research Council and from Mr. E. Alec Cato.

	Page.
<b>ABSTRACTS FROM CURRENT MEDICAL LITERATURE—</b>	
Radiology	418
Physical Therapy	419
<b>BRITISH MEDICAL ASSOCIATION NEWS—</b>	
Meeting of the Federal Council	420
Scientific	423
<b>CORRESPONDENCE—</b>	
Biology and Medicine	425
Ovarian Rupture Causing Intraperitoneal Haemorrhage	425
The Sanatorium—Quo Vadis?	425
Spring Catarrh	426
Hospital Insurance	426
<b>NAVAL, MILITARY AND AIR FORCE—</b>	
Appointments	426
<b>UNIVERSITY INTELLIGENCE—</b>	
The University of Sydney	427
<b>NOTICE—</b>	
The Stawell Oration	427
<b>OBITUARY—</b>	
William John Russell	428
<b>NOMINATIONS AND ELECTIONS</b>	428
<b>DIARY FOR THE MONTH</b>	428
<b>MEDICAL APPOINTMENTS VACANT, ETC.</b>	428
<b>MEDICAL APPOINTMENTS: IMPORTANT NOTICE</b>	428
<b>EDITORIAL NOTICES</b>	428

the conditions during an epidemic. This and a paper to be published elsewhere represent the results obtained in a limited study of the influenza epidemic which affected Melbourne during June and July, 1939. The epidemic appeared to have involved most of southern Australia, and was widespread in the country districts of Victoria as well as in Melbourne. The clinical symptoms were of the type regarded by Stuart-Harris *et alii*<sup>(1)</sup> as characteristic of epidemic influenza, and the great majority of cases were mild. Typical ferret pathogenic virus strains were isolated in four of the six attempts made, and, as will be shown, all typical cases showed a sharp rise in antibody against the Melbourne strain of virus isolated in 1935. The immunological characters of the strains isolated will be described elsewhere. It is only necessary to state that all were of the same general type as "Melbourne" and that this strain could therefore be justifiably used in estimating antibody changes in human serum.

Two groups of people have been studied. For the past three years all members of the professional and assistant staff of the institute have been bled in May or June with a view to the possible occurrence of a winter epidemic of influenza. The sera were separated, heated to 56° C., ampouled and stored in the refrigerator. After the epidemic period a second bleeding was made and the two sets of serum were compared.

The occurrence of a very sharp simultaneous outbreak in a ward of mental hospital patients under the care of one of us suggested a similar study of this group as an example of a population with an unusually severe exposure to infection. It was, of course, impossible to obtain samples of serum before infection, but the first bleedings were made as soon as possible and the second three weeks later.

#### Technique.

**Serum Neutralization Tests.**—Tests were made against the egg-adapted "Melbourne" strain on the chorio-allantois of chick embryos by the technique used in this laboratory (Burnet<sup>(2)</sup>). The results are expressed in the form of the percentage of foci produced when a mixture of equal parts of undiluted serum and suitably diluted virus is placed on the membrane. A strong serum, for example, mixed with undiluted virus may give an average of 10 foci, while a 1:20,000 dilution of virus alone gives an average of 20 foci. The percentage to which the count is reduced is therefore 0.005. In the graphs these percentage values are shown according to an inverted logarithmic scale. Three or four eggs were used for each mixture, and after preliminary tests had been completed each pair of sera was tested against the same stock virus. The relative titre of first and second sera can be taken as accurate to within  $\pm 50\%$ ; but there is probably a larger error in the absolute values given, since with different stock virus the same serum may give values one of which may be two to three times that of another.

**Complement Fixation.**—Antigen was made from the egg-adapted "Melbourne" strain of virus and was used in all tests. The reagents were prepared according to the technique previously described (Lush and Burnet<sup>(3)</sup>). Doubling dilutions of each serum were made and the test was set up as follows: saline solution 0.1 cubic centimetre (two drops from standard pipette), serum 0.1 cubic centimetre, complement 0.1 cubic centimetre (three minimum haemolytic doses), antigen, diluted 1:20, 0.1 cubic centimetre. The reagents were added to the tubes in the order given, mixed thoroughly by shaking, and placed in the ice box over night (18 to 20 hours). Two drops (0.1 cubic centimetre) of a 3% suspension of sensitized sheep red cells were then added, the mixtures shaken and placed in the water bath at 37° C. for 30 minutes. The results were read immediately after removal from the bath. Controls of the lowest dilution of serum and of complement with one and a half minimum haemolytic doses of complement were always included. In the discussion on the results, references to dilution of

serum are in terms of the final dilution in the completed test, that is, five times the dilution at which the serum was added.

#### An Acute Epidemic in a Ward of a Mental Hospital.

On June 12, 1939, an acute outbreak of influenza occurred in a ward of the Repatriation Mental Hospital, Bundoora. Of the 72 men in the ward at that time, 13 showed typical symptoms on June 12 or 13; only two other cases occurred, eleven and twelve days later. On June 13 saline garglings were obtained from four patients, and from a pool of these the strain "Bundoora" was eventually isolated. Blood was at the same time taken from these four patients. The other nine patients and 24 of the patients in the ward who had not had influenza were bled on June 17. Second bleedings were made from the same individuals on July 8, that is, twenty-one days after the first bleedings. One of the 24 chosen at random for bleeding amongst those who did not show symptoms in the first outbreak had a typical attack on June 23, and the results with his serum samples are included with those from the earlier group of cases.

The average age of individuals in the ward was about fifty years, the patients being ex-soldiers of the 1914-1918 war. During the week prior to the outbreak the weather was often bad and the men spent a considerable amount of each day in fairly close contact in the day room and in the dining room, under ideal conditions for the spread of a droplet infection. Since visitors have access to the ward on every day of the week, it has not been possible to trace the source or time of infection, but the explosive nature of the outbreak makes it reasonably certain that most of them were exposed to relatively heavy infection one or two days before the first outbreak.

The symptoms corresponded well with those regarded as characteristic of epidemic influenza by Stuart-Harris *et alii*.

**Onset.**—Within a few hours the patient, from being in normal health, had developed fully all the initial symptoms, sharply contrasting with the common endemic febrile catarrh which often develops slowly to a height over several days.

**Symptoms and Signs.**—At the outset there was headache, often severe, and malaise. As a rule the patient wanted nothing better than to be left alone to lie in bed with his eyes closed. Generalized aches and pains were characteristic of the initial stage. There was no sore throat. The nose felt stuffy and dry, but there was no nasal discharge at first, although a profuse watery secretion often occurred on the second or third day. In a number of cases a dry cough developed, with complaint of substernal discomfort. The patients presented a heavy suffused appearance, with some conjunctival congestion and nasal obstruction. They showed only a moderate pyrexia of 99° to 102° F.

The duration of the illness varied from one to five days in uncomplicated cases, and all gradations in severity occurred, from a mild pyrexia with slight

constitutional disturbance lasting only one day, to the development of bronchopneumonia (one case).

The following variations in lower respiratory tract involvement were noted: (a) Complete freedom from cough or sputum in those cases which cleared up within forty-eight hours. (b) Dry cough, clearing without development of sputum. (c) Development of bronchitis, the dry cough becoming moist and taking a week or ten days to clear up. (d) Bronchitis progressing to bronchopneumonia. This occurred in one of the fifteen cases.

There is no record of recognizable influenza in this group since or during 1935, when the last proved epidemic occurred in Melbourne, although cases of febrile catarrh have occurred at irregular intervals.

**Serological Reactions.**—Figures I and II show the antibody titres on the two occasions, that is,

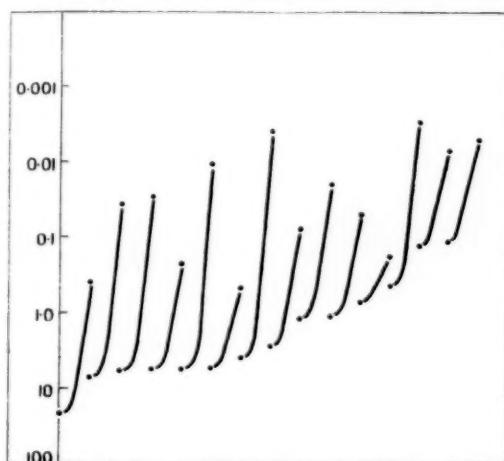


FIGURE I.

Rise in influenza antibody in "Bundoora" patients with clinical influenza.

one to five days and about twenty-six days after the time of the first symptoms. For all practical purposes these titres can be regarded as those at the time of infection and at the time of maximal

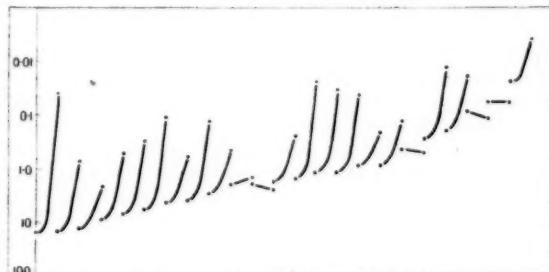


FIGURE II.

Changes in influenza antibody in "Bundoora" patients exposed to influenza but showing no symptoms of infection.

antibody level respectively. The main features of the graphs are (a) the sharp antibody rise which follows all the symptomatic infections, (b) the high proportion of individuals who can be shown to have

been infected (by the appearance of an antibody rise) but who had no symptoms sufficiently definite to be recorded, (c) the indication that the initial antibody level had very little influence in determining whether or not infection occurred.

#### Influenza amongst a Normal Adult Population.

All members of the institute staff were bled early in June, a week or two before the existence of an influenza epidemic was recognized. Cases occurred during the latter half of June and in July. A second bleeding was made during the first week of August or three weeks after the occurrence of symptoms for three of the later cases. There were two individuals with febrile attacks which did not resemble typical influenza and which were not associated with a rise in antibody. The influenza

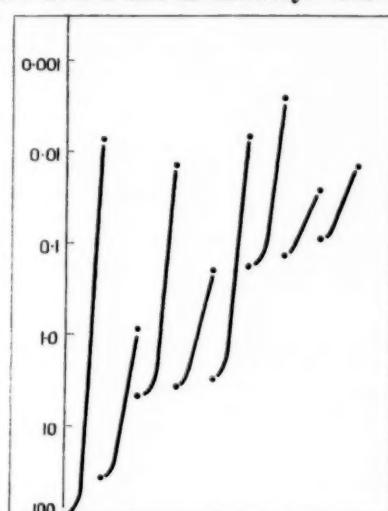


FIGURE III.

Changes in influenza antibody in members of the institute staff who suffered from influenza during June and July.

attacks were all mild, and of the character typical for the epidemic as described for the Bundoora cases. In Figures III and IV the results of serum

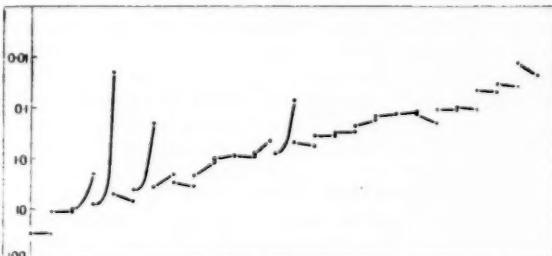


FIGURE IV.

A similar diagram for those members of the institute staff who showed no symptoms of influenza.

tests made against "Melbourne" egg virus are collected for comparison with the Bundoora series.

Again, all the individuals who suffered a typical infection show a well-marked rise in antibody; but there is a much smaller proportion of subclinical infections than in the former group.

## Complement Fixation Results.

The first and second sera of all the Bundoora patients and contacts were tested according to the complement fixation technique described. The results were difficult to correlate with those of neutralization tests. With few exceptions, frank cases of influenza occurring in persons with very low initial neutralizing antibody showed no fixation in the first serum sample and a considerable titre of complement-fixing antibody in the second. Apart from this group, almost every conceivable relationship between the two types of antibody could be found, except that in no instance was there a significant fall in either type between the two bleedings. Three patients with influenza and two with subclinical infections, all showing a typical rise in neutralizing antibody, showed no change in complement fixation titre. Three Bundoora contacts in whom no rise of neutralizing antibody was detected showed a significant rise in complement fixation titre. Apart from such dissociations in regard to change of titre of the two antibodies there were gross discrepancies in the relative amounts of the two antibodies in individual sera.

Table I shows the distribution of sera according to the titres found by both tests, and it will be seen that although there is a general positive correlation between the two tests, there are extreme individual discrepancies.

TABLE I.  
Comparison of Virus-inactivating and Complement-fixing Titre in Human Serum.

Virus-inactivating Titre.	Complement-fixation Titre.			
	0 to 10.	12 to 50.	60 to 125.	150+
0.001 to 0.01	0	3	1	2
0.01 to 0.1	1	6	5	4
0.1 to 1.0	2	14	6	7
1.0 to 10	5	12	1	2
10 to 100	4	2	0	0

The figures indicate the number of specimens of serum falling into each group. Both first and second samples are included in the series of 80 specimens.

It is clear that the complement-fixing antibody is not the neutralizing antibody, a finding which agrees with Hoyle and Fairbrother's<sup>(4)</sup> demonstration that the antigen responsible for complement fixation was a soluble substance present in infected tissues, and not the influenza virus particles. Both antibodies are or may be produced by infection with the virus; but different individuals apparently vary greatly in the relative activity of the two responses.

## Antibody against "Swine" Influenza Virus.

It is well known that in adult human serum antibody capable of neutralizing "swine" influenza virus is frequently present in considerable amount, although little or no activity is shown against any of the human strains. As there has been some discussion as to the significance of this type of antibody, six pairs of sera from patients or contacts showing a rise in titre against "Melbourne" virus were titrated for their content of "swine" influenza antibody, mouse tests being used. All but one showed a definite rise in titre. Table II shows two

typical results. The patient W. is of some interest, as samples of her serum for the previous three years had consistently shown no significant neutralizing antibody against any type of influenza virus. Following a typical moderately severe attack, neutralizing antibody against both "Melbourne" and "swine" strains appeared, together with a high complement fixation titre (200). The virus strain responsible for her infection was isolated and shown to be closely similar in antigenic character to "Melbourne". These results confirm those of Stuart-Harris *et alii*,<sup>(1)</sup> in showing that "swine" influenza antibody may be produced in adults by infection with human type virus. There is therefore no necessity to postulate that its presence indicates some previous infection with virus of "swine" type.

TABLE II.  
Rise in Antibody against "Swine" Influenza Virus in Serum from Influenza Patients.

Serum.	Serum Dilution against "Swine" Virus.			Neutralizing Power against "Melbourne" Egg Virus.	Complement-fixation Titre.
	1: 2	1: 10	1: 50		
H.1	1, 1, 1	4 <sup>4</sup> , 4 <sup>5</sup> , 4 <sup>7</sup>		0.12	50
H.2	0, 0, 0	2, 2, 1	4 <sup>4</sup> , 4 <sup>5</sup> , 4 <sup>7</sup>	0.005	50
W.1	4 <sup>4</sup> , 4 <sup>5</sup> , 4 <sup>6</sup>	4 <sup>5</sup> , 4 <sup>6</sup> , 4 <sup>8</sup>		100	0
W.2	1, 0, 0	4 <sup>5</sup> , 4 <sup>6</sup> , 3		0.0075	200

Mixtures of stock mouse passage virus with the serum dilutions shown were inoculated intranasally in mice. Survivors were killed at seven days and the lung lesions recorded by the usual signs.

1 to 3=increasing degrees of consolidation.

4=complete consolidation with death on the day shown by the index figure.

## Discussion.

The rise in serum antibody following an attack of influenza has been observed by many authors (Francis and Magill,<sup>(5)</sup> Smith and Stuart-Harris<sup>(6)</sup>) using neutralization tests in mice. It is also demonstrable by the complement fixation test (Fairbrother and Martin<sup>(7)</sup>). There is less certainty about the two points which have interested us, particularly the influence of initial antibody level on susceptibility to infection and the relative frequency of subclinical infections. Stuart-Harris *et alii*<sup>(1)</sup> examined a series of 50 specimens of serum from medical students in October, 1936. Eight of these had clinical influenza during the 1936-1937 epidemic in England; there was no correlation between the initial antibody and the occurrence of influenza. There has been a good deal of evidence that the average level of antibody in a random population is highest after an epidemic and that therefore subclinical infection must occur with some frequency; but there are few individuals who have been actually shown to have experienced such an infection. Stuart-Harris *et alii*<sup>(1)</sup> found several such amongst those who provided the sera which they received from St. Helena.

In order to depict the relationship between initial antibody titre and susceptibility to infection, clinical or subclinical, the data from Figures I and II have been used to construct Figure V. In each range of initial antibody titre the proportion of individuals with clinical influenza, without symptoms but with significant antibody rise, and without

either symptoms or antibody rise, are shown. It will be seen that in neither series is there any very obvious correlation between low initial antibody and the occurrence of clinical infection. The small group of eight persons with high initial antibody (0.1% to 0.01%) certainly showed only one clinical case and one subclinical; but the differences in incidence amongst the groups with lower antibody levels are hardly significant. The one striking feature of the diagrams is the far greater proportion of subclinical infections in the Bundoora series. It appears certain that the whole Bundoora population was heavily exposed to infection at the time of the epidemic, while the institute staff was exposed only to casual contacts. Most of the latter group who were infected developed clinical symptoms, and it may be that the higher incidence

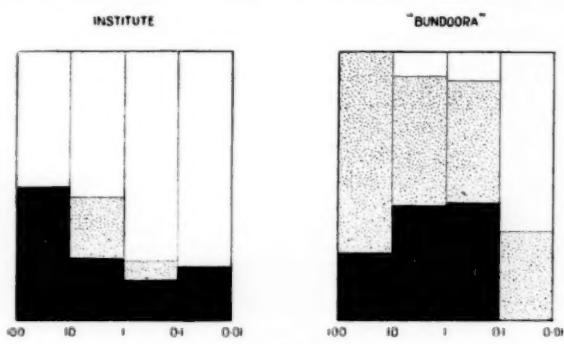


FIGURE V.

To show the relation between initial antibody level and the occurrence of clinical or subclinical infection. The smallest amount of antibody, 100-10, is shown at the left of the diagrams, with successively greater amounts to the right. Black: proportion of clinical infections. Stippled: proportion of subclinical infections. White: proportion with no evidence of infection.

of subclinical infections at Bundoora was related to the much higher average age of the group. The possibility should, however, be borne in mind that psychopathic conditions might have some influence in increasing the ratio of subclinical to clinical infections. It is possible that an influenza infection which would produce clinical symptoms in a normal individual would pass unnoticed in certain psychopaths. One of us (J.F.J.C.) has observed during this winter two chronic dementes with extensive acute pneumonia without pain, cough or rise in temperature, the lung lesions being discovered only in the course of clinical examination on account of some weakness, loss of appetite and increase in mental confusion.

#### Summary.

The antibody changes in serum from persons suffering from or exposed to infection with influenza during the Melbourne epidemic of June-July, 1939, are described.

All cases of typical influenza showed a sharp rise in neutralizing antibody and usually an increase in titre for complement fixation tests.

There was no detailed correspondence between neutralizing and complement-fixing antibody,

indicating that distinct antigens and antibodies are involved in the two reactions.

Study of a ward outbreak at a mental hospital showed the occurrence of a very high proportion of subclinical infections in this population. In a group of normal adults a much smaller proportion of subclinical infections occurred.

There was no evident correlation between the initial antibody titre and the likelihood of clinical or subclinical infection.

#### References.

- <sup>1</sup> C. H. Stuart-Harris, C. H. Andrewes and Wilson Smith, with D. K. M. Chalmers, E. G. H. Cowen and D. L. Hughes: "A Study of Epidemic Influenza, with Special Reference to the 1936-37 Epidemic", Medical Research Council of the Privy Council, Special Report Series No. 228, 1938.
- <sup>2</sup> F. M. Burnet: "The Use of the Developing Egg in Virus Research", Medical Research Council of the Privy Council, Special Report Series Number 220, 1936.
- <sup>3</sup> D. Lush and F. M. Burnet: "Influenza Virus on the Developing Egg. 6: Complement Fixation with Egg Membrane Antigens", *The Australian Journal of Experimental Biology and Medical Science*, Volume XV, 1937, page 375.
- <sup>4</sup> L. Hoyle and R. W. Fairbrother: "Antigenic Structure of Influenza Viruses: The Preparation of Elementary Body Suspensions and the Nature of the Complement-Fixing Antigen", *Journal of Hygiene*, Volume XXXVII, 1937, page 512.
- <sup>5</sup> T. Francis, junior, and T. P. Magill: "Immunological Studies with the Virus of Influenza", *The Journal of Experimental Medicine*, Volume LXII, 1935, page 505.
- <sup>6</sup> Wilson Smith and C. H. Stuart-Harris: "Influenza Infection of Man from the Ferret", *The Lancet*, Volume II, 1936, page 121.
- <sup>7</sup> R. W. Fairbrother and A. E. Martin: "Serologic Studies in Epidemic Influenza, with Particular Reference to the Persistence of Antibodies after Infection", *The Lancet*, Volume I, 1938, page 718.

#### INDUSTRIAL EYE INJURIES.<sup>1</sup>

By D. R. GAWLER,  
Ophthalmic Surgeon, Fremantle Hospital,  
Western Australia.

My theme will be a few experiences and observations on the treatment of industrial eye injuries, and all I shall say will be concerned with patients whom I have myself seen and treated. Perhaps on occasions I may seem to be uncharitably critical of the work of general practitioners; let me say at once that I have been a general practitioner myself, and I now know that in the past I have erred grievously in my treatment of patients suffering from eye injuries, whom I should have handed over for specialist treatment much earlier. I come among you, therefore, as a sinner, but a repentant and, I hope, a reformed sinner. I have had an opportunity of studying the problem from the standpoint of the general practitioner and from that of the specialist, and the fact that I have had, as it were, a foot in both camps, gives me the right to a little plain speaking. Let me say here, however, that my remarks would not apply to the general practitioner who has had special eye experience. I am assuming, perhaps unjustly, that my hearers know as much about eyes as I did as a general practitioner—that is, remarkably little.

I propose to deal with the subject under three headings: (i) injuries to the lids, (ii) injuries to the conjunctival sac, including the cornea, (iii) injuries involving the interior of the eye.

<sup>1</sup> Read at a meeting of the Western Australian Branch of the British Medical Association at Kalgoorlie on September 10, 1939.

**Injuries to the Lids.**

Injuries to the lids are of all descriptions, ranging from extensive bruising (a black eye, which looks much more alarming than it really is) to severe wounds involving the whole thickness—skin, tarsus and conjunctiva. Mere subcutaneous bruising, of course, will subside without special treatment, and the consequent ptosis, due to the extra weight, will also disappear. Longitudinal wounds—that is, those along the fibres of the orbicularis—heal readily and without scarring. Vertical wounds, however, particularly if they involve the free edge of the lid, are much more troublesome. They are apt to gape, and unless the edges are cleaned at once and brought by a number of sutures into good apposition, a notch or coloboma is left in the free edge. In the less severe cases this is unsightly, and in the more severe cases it leads to constant exposure of the eye, with irritation and watering. It cannot be too strongly emphasized that lid repairs of this nature should be done as early as possible; the longer the period that has elapsed, the harder it is to do a satisfactory job. It is at the free edge that union is difficult to obtain; further away, as a rule, healing is early and good. Near the free edge sutures must be applied very carefully and at frequent intervals. Lid wounds near the inner canthus are peculiarly troublesome, as they are likely to involve the canaliculus and cause epiphora. In such cases the inner cut end of the passage must be found and the passage slit up; if this procedure is delayed until cicatrization has set in, it is almost impossible to find the inner end of the passage and epiphora is certain.

In some cases, when the medium of injury has been a heavy and blunt object, apart from an actual wound of the lids, a paresis of the muscles which raise the lids may be present, causing ptosis, which completely closes the eye. I had a case recently in which this occurred. Prognosis is as a rule good. Unless rupture of the fibres has occurred the muscle gradually recovers tone and the lid is raised again, sufficiently, at any rate, not to obscure vision. However, when this does not occur, various operations have been devised to raise the lid, none of them very satisfactory, and all rather difficult in technique. Of them all I favour the Hess operation. It is, however, not a procedure that I should recommend to one without previous experience.

There is no doubt in my mind that the most troublesome lid conditions arising from industrial injuries are those caused by burns from either heat or strong chemicals. I have seen the most appalling scarring and distortions arising from such a cause, and in most cases the damage is largely permanent. It is not the actual damage to the lids which is so severe; it is the exposure of the cornea, with consequent irritation, ulceration and loss of vision. In such cases a plastic operation based on the requirements of the particular patient is the only hope. Such operations are of extreme technical difficulty and are unfortunately often unsuccessful.

The usual consequence of skin destruction around the eye is contraction of the scar and dragging out

of the lid—cicatricial ectropion. The essentials of treatment in such cases are, first, the dissection of all cicatricial tissue so as to release the lid and allow it to be replaced, and, secondly, the covering of the raw area with epithelium to prevent the growth of new scar tissue. It is more easily said than done, and much ingenuity in devising ways and means of accomplishing these ends is required. Unfortunately I have not time to go deeply into the matter here. As a rule these operations should be delayed until the condition has finally settled down, all sepsis has been eliminated, and any caries of the orbital margins has been cleared. Sometimes a temporary tarsorrhaphy may help to prevent some measure of deformity which would otherwise develop. Massage of the scar tissue during the time of waiting for the operation will sometimes be of value. It is not possible here to do more than indicate some of the many procedures adopted; the details vary with the conditions present in the individual case. Local anaesthesia is used, and is usually obtained by infiltration with "Novocain". When extensive scarring is present the scar tissue is completely dissected away and the lid is mobilized. The problem is next to cover the gaping wound surface. One can do this sometimes by undermining the adjacent skin on either side until it is sufficiently loose to be drawn over the wound and closed by sutures. A simple procedure of this nature, suitable in cases that are not severe, is the so-called "VY" operation.

Often, however, the neighbouring skin cannot be sufficiently mobilized and some other plan must be adopted. In these cases non-pedicle skin flaps often give good results. The graft is obtained from the arm; it should be much larger than the area to be covered, which also should be put "on the stretch". The technical difficulties in this procedure are considerable, and there is often difficulty in getting the graft to take. My experience with these procedures has been small and in general disappointing.

In more severe cases, when subcutaneous tissue as well as skin has been destroyed, pedicle flaps are indicated and as a rule are obtained from neighbouring skin on the face. The technical difficulties and the discomfort to the patient which would result from the use of a flap from a limb render this plan impossible.

Before I leave the subject of the lids I must briefly refer to one other most unpleasant complication of lid injuries: I mean symblepharon, or adhesions of the inner surface of the lid to the ball of the eye. Generally the adhesion is loose and consists of a bridge of tissue leading from one to the other; but impairment of the mobility of the eye is almost invariable and results in most distressing diplopia whenever the eyes are moved. This is an exceedingly difficult condition to remedy by operation or any other measure; the raw surfaces from which the connecting strand of tissue is removed nearly always unite again. The best treatment is preventive: a glass prosthesis curved so as to avoid

the cornea is placed in the conjunctival sac immediately after the accident and retained until the raw surfaces have healed. Such a device may also be used after operation. If the connecting bands are small they may be cut off the surrounding conjunctiva, which is mobilized to cover the wound left at their former attachments. The wound in the bulbar area of the conjunctiva, owing to its greater mobility, is as a rule more easily dealt with than that of the palpebral portion of the conjunctiva, where the membrane is firmly bound down.

#### Injuries to the Conjunctival Sac.

From the lids I pass on to consider injuries of the conjunctival sac, in which, of course, is included the surface of the cornea. Owing to its comparatively exposed position, the cornea suffers most often and most severely. We have all, general practitioners and specialists, dealt successfully with hundreds of cases of foreign body in the cornea. I should like here to put in a plea for more respectful treatment of the corneal surface when the foreign body is being extracted. Admittedly the cornea is tough—fortunately it is very tough; and it is almost impossible without the exercise of considerable force to perforate it in removing a foreign body; but it can be and has been done, and it has been my lot on some occasions to witness the unpleasant consequences. The cornea on an average is rather less than a millimetre thick. It is lined externally by a layer of epithelium under which is Bowman's membrane. The epithelium may be picked off and yet may regenerate without permanent opacity; yet if Bowman's membrane immediately underneath is harmed, some measure of permanent opacity is certain. Very often, as in the case of small flying fragments of steel or the red-hot pieces of emery wheel which sometimes perforate deeply, this cannot be avoided; but it is up to us to make the opacity as small as possible. Unless such fragments are removed with the aid of a good loupe or slit lamp and under a good light, there is bound to be a certain amount of aimless fishing around before the foreign body is finally removed. Such fishing around always does extra and unnecessary harm, and a permanent opacity is left, much larger than it should be, with unpleasant consequences to the patient and to the insurance company. It is up to anyone who proposes to undertake the removal of foreign bodies from the cornea to provide himself with the above necessities in fairness to all concerned. Of course, asepsis must be rigidly observed as well, and knives and spuds employed must either be boiled or else be allowed to remain in spirit for some time before use. I can still remember a case of my own, in which removal of a fairly deep foreign body with a spud that had been in spirit for a few minutes resulted in severe keratitis followed by iritis. One cannot, of course, exclude the existence of virulent organisms in the conjunctival sac; but I have a guilty feeling that the responsibility in this case lay with me and my technique. Let us therefore be conservative in our handling of the corneal tissue and always bear in

mind that that cornea has to last the patient for the rest of his life.

Never risk perforation unless you are equipped to deal with the consequences. As soon as perforation occurs the anterior chamber disappears and the lens comes up against the back of the cornea, usually with damage to its delicate capsule and consequent partial or total cataract. Moreover, adhesions (synechiae) may develop between the iris and cornea, and if these are extensive they may induce secondary glaucoma. If a foreign body is deep and is of such a size or nature that its removal is a necessity, it is safer to refer the patient to a specialist and let him take the responsibility. If the foreign body is metallic, it may be safely said that, however small it is, it must be removed. If the foreign body is of stone, glass *et cetera*, and is small, in cases in which its removal would be likely to cause perforation I advise leaving the foreign body, particularly if, as often happens, it is tolerated without irritation. If the foreign body is of metal, even when it is totally embedded in the cornea, there is the ever-present risk of siderosis, with the possibility of sympathetic ophthalmia in the other eye. Theoretically, I suppose, the risk of siderosis resulting from a very small metallic foreign body is negligible; but practically it is still there. The trouble is that once sympathetic ophthalmia has developed in the uninjured eye, removal of the exciting eye has little effect; it must be carried out before symptoms appear in the uninjured eye. The onset of sympathetic ophthalmia is extremely insidious and is unnoticed by the patient; as a rule the patient is not seen until the disease is well established. It is unwise, therefore, to leave even a minute metallic foreign body in the cornea without making every effort to remove it.

#### Injuries Involving the Interior of the Eye.

I now come to the consideration of perforating injuries involving the cornea or sclera, or both; they are unfortunately too common and their consequences are serious. These consequences will be considered under two headings: first, the results of disorganization of the ocular tissues as a direct result of the injury and, secondly, the results of infection, the risk of which, naturally, is great under industrial conditions. In the case of perforation of the sclera, vitreous, and in the case of perforation of the cornea aqueous humour will almost certainly be lost; the consequences of this, although severe, are by no means hopeless. A considerable quantity of vitreous may be lost from the eye without much harm; the vitreous is never replaced as such, but the deficiency is made good with aqueous humour secreted by the ciliary body, usually without detriment to the eye. When a large amount of vitreous has been lost, however, detachment of the retina is likely to follow, and detachment from this cause is as a rule resistant to treatment, medical or surgical. Sometimes rupture of the sclera may occur subconjunctivally, without an external wound, from indirect violence. Such a condition is not always

easy to diagnose; but the tension of the eye is a good guide, being greatly lowered in these cases. This lowering of tension, however, is a sign which must be elicited with great care; roughness may have the effect of increasing the tear, with further extrusion of the ocular contents. Leakage of the aqueous due to corneal perforation means, of course, obliteration of the anterior chamber and bulging forward of the iris and lens. If this happens suddenly the suspension ligament of the lens may be wholly or partially ruptured and a partial or complete dislocation of the lens may take place. If this occurs forward it has the unfortunate effect of blocking the angle of the anterior chamber, with inevitable secondary glaucoma. This is a serious state of affairs, and usually means the loss of the eye. It occasionally happens that the lens is extruded through a tear in the sclera and lies outside under the conjunctiva. In no circumstances must the conjunctiva be opened so that the lens may be removed, as this procedure opens the way to intraocular infection; the lens must be allowed to remain, and it will probably be absorbed.

In perforation of the anterior chamber with sudden evacuation of the aqueous, a portion of the iris is commonly extruded or prolapsed through the wound, being carried there by the current of fluid. In no circumstances must any attempt be made to replace it. The iris tissue has inevitably been contaminated by the organisms always present in the conjunctival sac, and these, although possibly non-pathogenic for the conjunctiva, would have serious consequences if introduced into the interior of the eye. If the patient is to be referred to a specialist, careful irrigation of the conjunctival sac with warm boracic lotion and perhaps a drop or two of a mild antiseptic (argyrol or mercurochrome), and the application of a pad and firm bandage, are indicated. I advise against the use of either mydriatic or miotic at the present stage; either procedure might have the effect of dragging the soiled iris tissue back into the anterior chamber, with undesirable results. The next procedure is iridectomy; care must be taken that the iris tissue is drawn sufficiently far out of the wound to allow the surgeon to cut through uninfected tissue; the remainder will then spring back into the anterior chamber as a consequence of its inherent elasticity, and a gap or coloboma will show where the prolapsed portion has been excised. Even then miotics and mydriatics must be used with discretion, so that haemorrhage from the cut edges will be avoided. Too much force, of course, must not be used when the iris is being drawn forward, or the whole structure may be torn away from its insertion. This operation needs special equipment (iris forceps and scissors), and must be carried out promptly and efficiently, and, above all, aseptically. The patient's progress is good, although the gap in the iris, unless upward, may cause unpleasant dazzling for a while. It is as well to remember that the patient runs less risk for one, two or three days with the prolapsed iris *in situ* than he does from an unskilful or ill-judged iridectomy performed on the spot. While

the iris tissue is still blocking the wound of perforation, the most dreaded complication, intraocular infection, cannot occur.

Let me say a word about intraocular infection. The majority of perforating agents, pieces of steel *et cetera*, are usually of such a nature and travel so quickly that they arrive in the eye more or less sterile. It is from the conjunctival sac that the danger threatens, and all endeavours must be made to prevent the access of organisms into the interior of the eye. It is safe to say that once infection has occurred in the anterior chamber the gravity of the prognosis is doubled, and once it has reached the vitreous humour all hope is lost; evisceration should be undertaken to save the patient weeks of unnecessary suffering.

An eye affected with panophthalmitis is a dangerous subject for enucleation. When cutting the optic nerve one is opening a direct communication with the subdural and arachnoid spaces in the cranium. Should any infective matter from the eye leak into the orbit during the removal dire consequences may ensue.

When the infection is limited to the anterior chamber, however, and when treatment is prompt and vigorous, the prognosis is good. The essential of local treatment is to get and keep the pupil at its maximum dilatation, first to avoid the effects of posterior synechiae, and secondly to put the ciliary muscle at rest and thus decrease pain and irritation. If good dilatation can be obtained early the outlook is good; but unfortunately it is often exceedingly difficult to manage. The iris vessels are engorged and the tissue is spongy, the local irritation stimulates the sphincter muscles, which are more powerful than the dilator muscles; therefore the pupil contracts, and once posterior synechiae have formed it is well nigh impossible to obtain dilatation. Hot fomentations and atropine drops used every four hours are about all the measures that can be used at first. I have found that hypodermic injections of such preparations as "Prontosil" and "Edwenil" are of value in some cases, though on the whole, in my hands, they have been disappointing. In desperate cases subconjunctival injections of oxy-cyanide are sometimes helpful; but even when a local anaesthetic is energetically used, these injections are apt to be painful. An atropine and cocaine mixture may also be administered subconjunctivally when dilatation of the pupil is difficult in the early stages; when it has been obtained by these means it may usually be maintained simply by instillation of the drops.

It cannot be too strongly emphasized that the consequences of a lengthy attack of iridocyclitis are serious and permanent, and if such a case proves intractable further advice should be sought.

#### Conclusion.

In an address of this length any attempt to cover the subject completely is impossible. There are many important omissions, and for these I ask indulgence. The subject of intraocular foreign bodies and the technique of the giant and other

magnets, although important, is also outside the scope of this paper.

It will be noticed that I have made no attempt to include new and experimental work in this paper. I am not addressing an ophthalmological congress, and I have thought it safer and more appropriate to confine myself to measures, both medical and surgical, which are well established and which have given good results.

#### STERNAL BIOPSY.

By T. E. WILSON, M.D., B.Sc., M.R.A.C.P.,  
Resident Medical Officer, the Children's Hospital,  
Melbourne.

BONE MARROW biopsy has often been performed in Germany, Sweden and the United States of America; but although it is very important as an aid to the study of the aetiology, prognosis and treatment of the various disorders of the blood and is of limited use in clinical diagnosis, bone marrow biopsy has rarely been mentioned in the scientific literature of Australia. The advantages of successive examinations of the marrow during the course of a given disease, of the study of the effect of therapy on the marrow, and of the comparison of the marrow with the peripheral blood in various pathological conditions have been pointed out by Jones.<sup>(1)</sup>

For use in clinical diagnosis marrow biopsy has been proposed as indicated in those conditions which include leishmaniasis, chronic malaria, aplastic anaemia, aleucaemic leucæmia, agranulocytosis, myelomatosis, secondary carcinomatosis of bones and Gaucher's disease, and in which it is sometimes not otherwise possible to reach the correct diagnosis and, therefore, correct treatment and prognosis. However, it would seem that such cases, as pointed out by Scott<sup>(2)</sup> and by Kandel and Le Roy,<sup>(4)</sup> are infrequent. It has been suggested by Debre *et alii*<sup>(5)</sup> that aspirated sternal marrow from patients with suspected septicaemia should be incubated when attempts at culture from the blood have been persistently without result; but so far this procedure has not had an extensive trial.

In this series marrow biopsies were carried out in cases with the following provisional diagnoses: agranulocytosis (Case I), ovalocytosis (Case II), myelomatosis (Case III), leishmaniasis (Case IV), and aleucaemic leucæmia (Cases V and VI). The provisional diagnosis was confirmed in Cases I, II and V; but in Cases III and VI it was not possible to arrive at a final diagnosis from the biopsy specimens, and in Case IV there was no evidence of leishmaniasis or of leucæmia, although a general hypoplasia of the marrow was found.

#### Reports of Cases.

CASE I.—A female patient, aged twenty-eight years, had suffered for thirteen months from *tic douloureux*, and although the trigeminal nerve had been injected with

alcohol and later divided, the pain had persisted. To relieve this she had taken nine "Veramon" tablets per day for some weeks, together with a few "A.P.C." and "Veganin" tablets. A pustular eruption of the face and ulcerated gums then developed. The eruption had decreased under treatment with an autogenous vaccine, but the lesion of the gums had gradually extended. On admission to hospital the patient was very thin and there was some ulceration of the gums. A blood count gave the following information: the haemoglobin value was 12.2 grammes per 100 cubic centimetres (87%), the erythrocytes numbered 4,630,000 per cubic millimetre, the colour index was 0.94, and the leucocytes numbered 950 per cubic millimetre. The erythrocytes and platelets appeared normal. A differential leucocyte count showed that 1% were eosinophile cells, 12% were monocytes, and 87% were lymphocytes. A provisional diagnosis of agranulocytosis was made.

In order to exclude aleucaemic leucæmia, sternal biopsy was performed. Further marrow was removed from the sternum immediately after death. The results of the examination of the biopsy specimens are given in Table I. Similar counts were obtained from the marrow specimens removed during the autopsy at which the bone marrow appeared normal macroscopically and the thoracic and abdominal viscera were hemorrhagic and swollen. The final diagnosis was agranulocytosis, secondary to the administration of "Veramon" and causing maturation arrest of the marrow.

CASE II.—A male patient, aged thirty years, complained of weakness and nervousness of six years' duration, with transient attacks of pallor, and during this time he had been occasionally treated for pernicious anaemia. On examination he looked healthy; but examination of his blood gave the following information: the haemoglobin value was 13.8 grammes per 100 cubic centimetres (98%), the erythrocytes numbered 5,100,000 per cubic millimetre, the colour index was 0.96 and the leucocytes numbered 5,200 per cubic millimetre. The leucocytes and platelets appeared normal; but the erythrocytes showed the unusual phenomenon of ovalocytosis. No nucleated red cells were seen. The halometer reading was 6.5 $\mu$ . The differential leucocyte count was within normal limits. The mean corpuscular volume was 84.9 cubic  $\mu$ , the mean corpuscular haemoglobin content was 26.6 micromicrogrammes, and the mean corpuscular haemoglobin concentration was 31%. A palpable spleen extending for about two inches below the left costal margin was the only other abnormality found; but because of the absence of splenomegaly in the reported cases of ovalocytosis (McCarty,<sup>(6)</sup> Stephens and Tattlebaum<sup>(7)</sup> and others) sternal biopsy was performed. A provisional diagnosis of ovalocytosis was made. The marrow preparations appeared normal, as has always been found in ovalocytosis (Terry *et alii*<sup>(8)</sup>). The splenomegaly has persisted, and so far it has not been explained. The final diagnosis was ovalocytosis.

CASE III.—A female patient, aged forty-three years, was admitted to hospital on May 18, 1938, complaining of pain in the back of three months' duration, pallor and loss of weight. There were many tender bony prominences; but neither the spleen nor lymph glands were palpable. An X ray examination of the spine, the left shoulder, the pelvis, the sternum, the ribs and the right femur revealed patchy areas of decalcification without repair. The calcium content of the blood was 11.6 milligrammes per 100 cubic centimetres and the phosphatase content was 17 units. The blood sedimentation rate was 21 millimetres in sixty minutes, a diagonal line.

After a course of deep X ray therapy to the bones the pain persisted, and on September 29, 1938, a blood count gave the following information: the haemoglobin value was 11.3 grammes per 100 cubic centimetres (80%), the erythrocytes numbered 4,520,000 per cubic millimetre, the colour index was 0.88, and the leucocytes numbered 5,800 per cubic millimetre. Of the erythrocytes, 1.5% were reticulocytes. One normoblast was seen while 200 leucocytes were being counted, and the differential leucocyte count revealed a shift to the left in the granular series. The calcium content of the blood was 12.0 milligrammes per 100 cubic centimetres, and the phosphate content was 3.19 milli-

grammes per 100 cubic centimetres; the phosphatase content was 1.9 units. No Bence-Jones proteose was detected in the urine. The temperature occasionally rose to 100° F., and X ray examination revealed further involvement of the scapula and ribs. A provisional diagnosis of myelomatosis was made.

A sternal biopsy was performed; but the marrow smears contained only blood, and the microscopic sections showed an increase in the number of bony trabeculae and almost complete replacement of the marrow by a curious type of connective tissue. There was no evidence of active absorption or deposition of bone, and it was not possible to arrive at a diagnosis from the marrow preparations. Since then the patient's condition has remained unchanged. The provisional diagnosis on her discharge from hospital was osteomalacia.

**CASE IV.**—The patient was a male, aged fifty-two years. Five years ago, while he was living in the tropics, the left testicle and left side of the abdomen were swollen for a few months, and he was told then that tubercle bacilli were present in his urine. For the six months before his admission to hospital he had an ischio-rectal abscess, which was operated on without success. Although he had worked in a district infested with malaria he had never experienced a definite attack of fever.

On his admission to hospital his temperature was 99.4° F., his spleen was enlarged almost down to the pelvis, and there were small, soft, scattered lymph glands. The left epididymis was slightly enlarged, and in the left ischio-rectal fossa there was an extensive, discharging, tender, ulcerated area from which a few irregular acid-fast bacilli were recovered. No other pathogenic organisms were isolated from this ulcer; an attempt at culture of the pus for tubercle bacilli was without result, and examination of a piece of the ulcer removed for section revealed chronic inflammatory tissue, but no tubercles or tubercle bacilli. A blood count gave the following information: the haemoglobin value was 12.6 grammes per 100 cubic centimetres, the erythrocytes numbered 5,590,000 per cubic millimetre, the colour index was 0.8, and the leucocytes numbered 3,600 per cubic millimetre. Very few polymorphonuclear cells were present. In order to help eliminate the possibility of a diagnosis of leishmaniasis or of aleucaemic leucæmia a sternal biopsy was performed. A provisional diagnosis of leishmaniasis was made.

Biopsy revealed a great decrease in the cellularity of the marrow; the cells were present in normal proportions and no evidence of leishmaniasis was found. Since then a transverse colostomy has been performed, with great improvement in the ischio-rectal abscess and in the patient's general condition. It was decided that the splenomegaly was probably due to a subclinical malarial infection. The final diagnosis was chronic ischio-rectal abscess, possibly tuberculous, and hypoplasia of the marrow resulting from the chronic inflammation.

**CASE V.**—A boy, aged five years, was admitted to hospital on November 16, 1938. For two months he had been losing weight, had been listless, and had had a very poor appetite. On his admission he complained of headache, tiredness and slight epigastric pain. He was thin and pale; there were numerous small, slightly tender lymph glands in the groins, axillæ and neck, about two inches of liver dulness below the right costal margin, and a small ecchymosis on the abdomen. A blood count gave the following information: the haemoglobin value was 7 grammes per 100 cubic centimetres (50%), the erythrocytes numbered 3,000,000 per cubic millimetre, the colour index was 0.83, and the leucocytes numbered 7,800 per cubic millimetre. A differential leucocyte count gave the following information: 11% were polymorphonuclear cells, 1% were eosinophile cells, 4% were monocytes, 83% were lymphocytes, and 1% were primitive lymphocytes.

One month later the patient's general condition was approximately the same; but the blood findings then were as follows: the haemoglobin value was 7 grammes per 100 cubic centimetres (50%), the erythrocytes numbered 2,630,000 per cubic millimetre, the colour index was 0.94, and the leucocytes numbered 12,000 per cubic millimetre.

A differential leucocyte count revealed that 17% were polymorphonuclear cells and 83% were lymphocytes. As no primitive cells were seen, a lymph gland was removed from the right groin, but it exhibited no diagnostic features. Although it was believed that this was a case of aleucaemic leucæmia, this diagnosis had not been confirmed; and two months later, because the patient's general condition and blood picture were unaltered, a sternal biopsy was performed. The provisional diagnosis was aleucaemic leucæmia.

Examination of the marrow smears revealed a great predominance of lymphocytic cells, many of which were immature, and the sections showed invasion and replacement of the marrow by these cells; the diagnosis of leucæmia was thus confirmed. The differential count on the marrow smears showed that 3% were normoblasts, 1% were late erythroblasts, 4.3% were lymphocytes, 91.6% were immature lymphocytes, and 1% were lymphoblasts. After a blood transfusion the child was sent home for eight weeks; but during this time he had severe pain in the legs and was very miserable. On his readmission to hospital a blood count gave the following information: the haemoglobin value was 3.4 grammes per 100 cubic centimetres (24%), the erythrocytes numbered 1,450,000 per cubic millimetre, the colour index was 0.83, and the leucocytes numbered 8,400 per cubic millimetre. A differential leucocyte count revealed that 2% were polymorphonuclear cells, 1% were monocytes, 96% were lymphocytes, and 1% were immature lymphocytes. Death occurred two weeks later, and at autopsy infiltration of the organs with lymphocytic cells was found. The final diagnosis was aleucaemic leucæmia.

**CASE VI.**—The patient was a boy, aged two years. He had been quite healthy until two weeks before his admission to hospital. During that time he was tired and had lost his appetite.

On examination, although apparently well nourished, he was listless. The liver border was down to the umbilicus, and the spleen was palpable one inch below the left costal margin. A few small lymph glands were palpable in the groins, axillæ and neck; the right lung was dull to percussion and the air entry was poor. A blood count gave the following information: the haemoglobin value was 11.9 grammes per 100 cubic centimetres, the erythrocytes numbered 4,170,000 per cubic millimetre, the colour index was 1.02 and the leucocytes numbered 19,800 per cubic millimetre. A differential leucocyte count showed that 47% were polymorphonuclear cells, 19% were old metamyelocytes, 2% were basophile cells, 10% were monocytes, and 22% were lymphocytes. One normoblast was seen while 200 leucocytes were being counted. An X ray examination of the chest revealed an effusion on the right side, with compression of the right lung and enlargement of the mediastinal glands. A lymph gland was removed from the groin; but the findings, although suggestive of Hodgkin's disease, were inconclusive. Two weeks later, as the blood findings and general condition of the patient had altered only slightly and the parents were waiting to go back to the country, a sternal biopsy was performed. The provisional diagnosis was Hodgkin's disease.

The differential count from the smears gave the following results: 16.3% were polymorphonuclear cells, 24.7% were metamyelocytes, 2.2% were myelocytes, 1.4% were pre-myelocytes, 0.3% were myeloblasts, 1.3% were eosinophile cells, 0.7% were basophile cells, 4.7% were monocytes, 0.7% were plasma cells, 21.1% were lymphocytes, 24% were normoblasts, 1.3% were late erythroblasts, 1% were early erythroblasts, and 0.3% were mitotic figures. Similar counts were obtained from the sections, which showed normal structure. Since then the patient has left hospital and has not been traced. The probable diagnosis on the patient's discharge from hospital was Hodgkin's disease.

#### Discussion.

There are risks attached to marrow biopsies, from infection and haemorrhage. This was first pointed out by Falconer and Morris<sup>(9)</sup> in cases of *purpura haemorrhagica*; but Lawrence and

Knutti<sup>(10)</sup> state that they have never encountered any trouble in removing marrow from patients with a diminished number of platelets and abnormal coagulating mechanisms. The risk of infection should be small if the biopsy is performed as other operations on bones; and in this series there was no case of infection or troublesome haemorrhage.

Probably the chief reason for the neglect of the study of the bone marrow has been the difficulty in preparing suitable specimens for examination and then in interpreting them. As shown by Rohr and Hafter,<sup>(11)</sup> the usual *post mortem* specimens removed ten to twenty hours after death are practically useless for detailed examination. All the specimens discussed below were removed during life or within a few minutes of death.

#### Methods.

The sternum was trephined under local anaesthesia in accordance with the technique of Custer,<sup>(12)</sup> except that a trephine five millimetres in diameter similar to that described by Seyfarth<sup>(13)</sup> was used instead of a trephine one centimetre in diameter. The smaller trephine was found to permit of the removal of a sufficiently large piece of bone for sectioning and of the curetting of the marrow through the opening made.

Under local anaesthesia an incision three centimetres long was made in the mid-line over the sternum opposite the third rib, special care being taken to infiltrate the periosteum with anaesthetic; the periosteum was then incised and retracted. A piece of bone five millimetres in diameter was then removed with the hand trephine. During this procedure the patients did not complain of pain, but rather of a sensation of heavy pressure. The marrow cavity was curetted with a small spoon and the material obtained was emulsified in serum of the patient's own group, or preferably the patient's own serum, as was originally suggested by Isaacs<sup>(14)</sup> and which is now also used by Gordon<sup>(15)</sup> and others. It has not been necessary to plug the bone with wax to control haemorrhage, for this has always been slight; but it is conceivable that plugging would occasionally be required. The periosteum was then replaced (but not sutured) and the wound in the skin was closed with horsehair sutures. The emulsified marrow was spun down and washed with serum. From the deposit smears were made as for blood, and after having been dried in air for at least half an hour, were stained by the Leishman, May-Grunwald-Giemsa and peroxidase methods. The button of bone was fixed for six hours in Helly's fluid, washed in running water for an equivalent length of time, decalcified for three to six hours in a solution of equal parts of 85% formic acid and 20% sodium citrate, washed again in water and then the outer table of the bone was removed. The button of bone was then dehydrated rapidly through 70%, 80%, 90%, 95% and absolute alcohol (the first two of these contained sufficient Lugol's iodine solution to make the colour a dark brown), cleared in chloroform and embedded in paraffin. The sections were cut as thin as possible (4 $\mu$ ), and after removal

of the paraffin and washing with serum were stained with Leishman, May-Grunwald-Giemsa, Jenner-Giemsa and eosin-azure II stains.

The use of curettings for sectioning as originally suggested by Rhoads and Castle<sup>(16)</sup> possesses the advantage that little or no decalcification is necessary; but I have found difficulty in obtaining suitable pieces for sectioning from the live patient, owing to the pain produced, whereas the gentle curetting used to obtain material for smears is practically painless. This method, moreover, produces admirable results with fresh *post mortem* material. Of the other fixatives and decalcifying agents used, Zenker's solution with acetic acid gave good results with those specimens in which sufficient decalcification was brought about by the acetic acid alone. Fixation in mercuric chloride and osmic acid (Stump<sup>(17)</sup>) produced equally good results. The most consistent results with the staining of sections were obtained by the May-Grunwald-Giemsa method described by Schleicher and Sharp,<sup>(18)</sup> and with smears stained by Leishman's method. Celloidin, though highly recommended by many authors for the preservation of cellular detail, was not used for embedding as a routine, because it was not possible to obtain such thin sections as with paraffin unless the celloidin block itself was first embedded in paraffin and the sections were then cut. Paraffin sections were also preferred by Stump<sup>(17)</sup> for the same reason.

Many methods have been proposed for the preparation of marrow smears; but I have found that the method of emulsification in serum and the preparation of films from the deposit gave the best results. Imprints on dry slides made with the button of bone or with curettings have been highly recommended by Jones and Downey<sup>(2)</sup> for the preservation of cellular details and accuracy in differential counts. In my experience this method has been found to give good preparations if the marrow specimens contained very little fat (that is, were hyperplastic) and if the bone ends were covered with blood, as always happens with biopsy specimens: but if the specimens were obtained *post mortem* the bone ends were relatively dry and it was much more difficult to make satisfactory imprints. The importance of this point is that the necessary correlation between biopsy and *post mortem* specimens is not attainable with imprints.

#### Aspiration and Trephining as Methods of Biopsy.

Tibial bone marrow biopsy was first performed by Ghedini<sup>(19)</sup> in 1908, and later by Zadek,<sup>(20)</sup> Falconer and Morris,<sup>(9)</sup> Peabody<sup>(21)</sup> and Escudero,<sup>(22)</sup> but has rightly not come into general use owing to the difficulty of approach to the marrow of the tibia, and to the normal acellularity of tibial marrow of adults, which gives information only in those cases in which there is a general hyperplasia of the marrow.

Trephining of the sternum was introduced in 1923 by Seyfarth,<sup>(13)</sup> who first used it in the diagnosis of chronic malaria and leishmaniasis. Since

then it has been carried out in many pathological conditions by Custer,<sup>(12)(23)(24)</sup> Rhoads and Castle,<sup>(16)</sup> Lawrence and Knutti,<sup>(10)</sup> Jones,<sup>(25)(26)(27)</sup> Dameshek and Valentine,<sup>(28)</sup> Rhoads and Miller,<sup>(29)</sup> Dameshek,<sup>(30)</sup> and Stasney and Higgins.<sup>(31)</sup>

In 1927 Arinkin<sup>(32)</sup> introduced sternal puncture by means of a hollow needle, and this procedure has since been carried out by many workers, including Erf and Fine,<sup>(33)</sup> Tempka and Braun,<sup>(34)</sup> Reich,<sup>(35)</sup> Nordenson,<sup>(36)</sup> Osgood and Young,<sup>(37)</sup> Kingerly *et alii*,<sup>(38)</sup> Kato,<sup>(39)</sup> Vogel and Bassen,<sup>(40)</sup> and Scott.<sup>(3)</sup>

The relative values of the trephine and puncture methods have been recently discussed by Dameshek, Henstell and Valentine,<sup>(41)</sup> who concluded that the chief advantage of the puncture biopsy was its simplicity, but that this was greatly outweighed by its inaccuracy. The main uses for puncture biopsy seem to be in young children (Kato<sup>(39)</sup>) and in cases in which repeated examinations are required, such as the one recently described by Erf and Fine.<sup>(33)</sup> Custer,<sup>(24)</sup> among others, makes the statement that puncture biopsies alone are nearly valueless, in that the relative proportion of cells and their relationship one to another cannot be determined. He also states that an examination based on marrow removed from but one spot is woefully inadequate. This is certainly true for its use in estimating the total amount of active marrow present in the body; but recently Stasney and Higgins<sup>(31)(42)</sup> have shown that in man and in the dog there is essentially the same trend in the relative percentage distribution of the cells in the marrow from different regions.

As already mentioned, Dameshek, Henstell and Valentine<sup>(41)</sup> compared smears prepared by the

puncture method with smears from curettings, and showed that the latter were superior for the following reasons. Firstly, with puncture preparations it was impossible to tell whether the absence or diminution of cells was due to actual aplasia or to faulty technique. Secondly, in puncture preparations the primitive cells, especially of the red series, were often greatly diminished. This is in accord with Maximow's experiments<sup>(43)</sup> in which he was unable to remove the most primitive erythroblasts from the marrow even by repeated perfusion. Thirdly, megakaryocytes were only occasionally seen in puncture preparations.

Segerdal<sup>(44)</sup> has pointed out that it is impossible to tell in the presence of a pronounced peripheral lymphocytosis (more than 50,000 lymphocytes per cubic millimetre) whether the sternal puncture films which show over 90% of lymphocytes consist of blood or of marrow. Furthermore, according to Scott,<sup>(3)</sup> a normal lymphocyte count in puncture films does not exclude the diagnosis of lymphatic leukaemia. It is only by the use of sections that a proper estimate may be made of the degree of cellularity of the marrow. Dameshek, Henstell and Valentine also conclude that in all cases both sections and smears should be examined, because only the sections permit a study of the structure of the marrow, and because when the marrow in smear preparations is obviously hyperplastic it is at times difficult to state definitely whether or not leukaemia is present.

Table I contains the results of differential counts on both smears from emulsified marrow and sections obtained in 14 different pathological conditions. These smears and sections were all prepared from

TABLE I.  
Differential Counts on Smears and Sections.

Case Number.	Diagnosis.	Source of Differential Count.	Neutrophile Cells. (Percentage.)	Metamyelocytes. (Percentage.)	Myelocytes. (Percentage.)	Promyelocytes. (Percentage.)	Myeloblasts. (Percentage.)	Eosinophile Cells. (Percentage.)	Basophile Cells. (Percentage.)	Monocytes. (Percentage.)	Primumonocytes. (Percentage.)	Plasma Cells. (Percentage.)	Lymphocytes. (Percentage.)	Lymphoblasts. (Percentage.)	Normoblasts. (Percentage.)	Erythroblasts. (Percentage.)	Megaloblasts. (Percentage.)	Erythrocytes. (Percentage.)	Histiocytes. (Percentage.)	Mitotic Figures. (Percentage.)	Ratio of Red to White Cells.	Megakaryocytes.	
I	Agranulocytosis	R <sup>1</sup>	—	—	1.6	4.0	6.5	7.2	0.7	—	—	0.4	74.8	—	—	—	—	—	—	1: 19.8	0.1		
VII	Monocytic leukaemia	N <sup>2</sup>	1.6	4.4	12.0	12.4	3.4	9.6	0.4	—	—	0.8	33.5	—	10.4	3.2	7.7	—	—	1: 6.1	3.4		
VIII	Acute lymphatic leukaemia	R	0.1	0.2	0.8	—	—	15.4	1.1	0.2	76.2	0.6	18.3	—	—	—	—	—	—	1: 82.3	—		
IX	Chronic lymphatic leukaemia	R	0.1	0.3	3.1	0.2	—	—	—	—	66.6	0.6	0.6	4.0	—	6.4	0.2	0.2	1: 0	1: 9.9	—		
X	Chronic myeloid leukaemia	R	0.1	0.5	0.1	—	—	—	—	—	0.4	—	0.2	0.4	1.3	0.2	0.8	0.6	—	1: 65.7	—		
XI	Pernicious anaemia	R	5.8	12.9	7.5	0.7	0.1	1.8	0.4	—	—	—	95.5	—	—	—	—	—	—	1: 9.6	0.4		
XII	Cirrhosis of the liver	R	14.6	22.6	6.1	1.1	—	8.4	—	—	—	—	—	97.6	1.0	—	4.0	—	—	—	1: 15.7	—	
XIII	Carcinoma of the stomach	R	11.2	33.2	4.6	0.1	—	0.2	—	0.1	—	—	—	—	—	—	—	—	—	1: 61.8	—		
XIV	Carcinoma of the caecum	R	27.6	32.2	9.6	0.4	—	0.2	—	0.2	—	0.4	5.6	—	28.6	1.0	—	1.4	0.2	—	—	1: 5.4	0.6
XV	Carcinoma of the sigmoid colon	R	6.4	15.6	14.2	1.0	0.0	5.2	—	0.2	—	0.4	12.1	—	8.0	3.3	0.1	0.1	0.6	—	1: 1.6	0.1	
XVI	Carcinoma of the rectum	R	35.8	15.9	6.0	0.7	0.2	2.4	0.2	0.1	—	0.4	7.6	—	39.6	7.0	0.6	2.0	0.2	—	—	1: 1.1	0.2
XVII	Strangulated bowel	R	9.4	19.4	4.1	0.2	0.6	—	—	—	—	0.6	0.2	—	58.2	7.4	—	0.2	0.12	—	—	1: 3.2	0.4
XVIII	Septicæmia	R	4.7	11.4	6.4	2.5	1.9	2.7	—	0.1	—	2.4	9.7	—	29.3	4.8	—	1.6	0.5	—	—	1: 1.8	—
XIX	Cut throat	R	6.8	14.2	13.2	0.8	—	3.8	—	—	—	1.0	3.4	—	40.8	16.0	—	—	—	—	—	1: 0.8	—
		N <sup>2</sup>	16.3	23.3	6.12	1.2	0.9	1.2	0.6	0.2	—	0.6	6.7	—	28.3	6.4	0.3	1.0	0.5	—	—	1: 1.8	0.1
		N	2.6	13.8	18.6	5.4	—	2.6	—	—	—	1.8	13.0	—	29.2	7.6	—	—	2.0	0.6	—	1: 1.7	0.7
		N	5.4	57.6	8.5	—	—	2.8	—	—	—	0.2	5.3	—	15.9	3.8	—	—	0.1	1: 4.1	—	0.1	
		N	18.2	23.6	2.8	—	—	6.6	—	—	—	0.6	0.8	—	36.8	8.4	—	2.2	—	—	—	1: 23.6	0.4

<sup>1</sup> R = Differential counts on smears.

<sup>2</sup> N = Differential counts on sections.

biopsy material or from material removed immediately after death. In this table the megakaryocytes are expressed as a percentage of the total nucleated cells present, but are not included in the differential counts. On the sections the counts have been taken in adjacent fields proceeding in a straight line, at least 500 cells being counted in the sections and 1,000 in the smears. For the estimation of the sparse cell types I have used the method of Custer and Krumbhaar,<sup>(45)</sup> which depends on the estimation of the average number of cells of all kinds per field. The number of times that erythrogones have been mentioned in the scientific literature lately (Dameshek and Valentine,<sup>(28)</sup> Kato,<sup>(39)</sup> Rhoads and Miller,<sup>(29)</sup> and others), and the fact that cells were occasionally found, the morphology of which coincided with that described by Rhoads and Miller,<sup>(29)</sup> and which could not be otherwise identified, seemed to be grounds for separating them in the differential counts. They are defined by Rhoads and Miller<sup>(29)</sup> as small round cells containing a narrow rim of basophilic cytoplasm and a round nucleus filled with a mass of densely matted, deeply staining chromatin. Kato<sup>(39)</sup> classes them with lymphocytes; but although their position in the scheme of development of the blood cells is obscure, they appear to be morphologically different from the lymphocytes and have in this paper been separated from them. The term "megaloblast" has been reserved for those cells 10 $\mu$  to 12 $\mu$  in diameter, with a large, lightly staining nucleus containing threads of chromatin, often with nucleoli and presenting a scroll-like appearance, whether the cytoplasm is basophilic or haemoglobinized; the controversy about the origin and development of these cells is avoided. The almost complete absence of mast granules from the sections is due to the solubility of the granules in the fixatives used. If it is desired to list the mast cells, then the tissue should be fixed in methyl alcohol, this process to be followed by staining with alcoholic thionine (Downey<sup>(21)</sup>). For those accustomed to the study of blood films the marrow count from properly prepared smears or imprints is comparatively easy, as Custer and Krumbhaar state;<sup>(45)</sup> but owing to the different appearances of the cells, differential counts on sections are more difficult, even when first-class preparations are available.

In Case III examination of the sections revealed almost complete replacement of the marrow by a curious type of fibrous tissue, and the smears contained blood but no marrow cells. The smears of the marrow from Case XX (Hodgkin's disease) contained a few disintegrating cells apart from the normal marrow cells, but showed no real evidence of the invasion of the marrow by the Hodgkin's granulation tissue as seen in the sections. The differential count on the smear was: polymorphonuclear cells, 8.2%; metamyelocytes, 19.4%; myelocytes, 7.0%; premelocytes, 1.2%; myeloblasts, 3.4%; eosinophile cells, 0.8%; basophilic cells, 0.2%; monocytes, 0.8%; lymphocytes, 11.8%; normoblasts, 33.2%; erythroblasts, 12.4%; megaloblasts, 0.4%; histiocytes, 1.2%; megakaryocytes, 2.0%. The

ratio of red to white cells was 1:1.2. The marrow among the Hodgkin's tissue in the sections appeared to be present in approximately the same proportions; but it was not possible to count the individual cells accurately. In this case, owing to the fibrous type of reaction, a diagnostic picture of Hodgkin's disease was not obtained from the smears; however, in some cases of Hodgkin's disease the diagnosis may be made from marrow smears (Varadi<sup>(46)</sup>). Although it was quite impossible to obtain true pictures of the marrow by the sole use of smears from either one of these cases (Cases III and XX), yet usually no difficulty was encountered in the making of a correct diagnosis from smears prepared from emulsified curettings alone.

Table I shows the close resemblance in most of the cases between counts obtained from sections and counts prepared from emulsified curettings. Cases I and XVI, however, present certain differences in these counts, and such variations, although they were not important in these cases, would sometimes affect the diagnosis.

Thus it may be concluded that a correct diagnosis may be made from smears alone in many cases; but there are also some cases in which the diagnosis depends on the findings in the sections, and other cases in which it is necessary to use both sections and smears in making a diagnosis. When a sternal biopsy is performed to help in the clinical diagnosis of a case it is imperative that all the information possible should be obtained from this procedure; and it would appear from the above discussion that this object may be realized in all cases only by the routine use of both types of preparations, smears from emulsified curettings and sections.

#### Summary and Conclusions.

1. The technique of sternal biopsy is discussed and the methods of treatment of the specimens which have been found to give the most satisfactory preparations are outlined.

2. Details of six patients are given on whom sternal biopsy was performed; and differential counts on both smears from emulsified curettings and sections are given from thirteen other cases.

3. Although in many cases in which sternal biopsy is indicated a correct diagnosis may be made from smears prepared from emulsified curettings, it is essential that both smears from emulsified curettings and sections should be used as a routine measure if all the information obtainable from the sternal biopsy is required in every case.

4. Sternal biopsy is of only limited use as an aid in diagnosis and should be used only when clearly indicated.

#### Acknowledgement.

I desire to express my indebtedness for the help and encouragement received from Dr. Hilda Gardner.

#### References.

<sup>(1)</sup> O. P. Jones: Quoted by H. Downey in "Handbook of Haematology".  
<sup>(2)</sup> H. Downey: "Handbook of Haematology", 1938.

(39) R. B. Scott: "Sternal Puncture in the Diagnosis of Diseases of the Blood Forming Organs", *The Quarterly Journal of Medicine*, Volume VIII, April, 1939, page 127.

(40) E. V. Kandel and G. V. Le Roy: "Limitations of Biopsy of Sternal Marrow", *Archives of Internal Medicine*, Volume LXIV, July, 1939, page 121.

(41) R. Debré, M. Lamy, G. Sée and J. Mailarmé: "L'exploration de la moelle osseuse (la myélographie et la médulloculture)", *La Presse Médicale*, Volume XLIV, November 14, 1936, page 1853; quoted by H. Downey, *loci citato*.

(42) S. H. McCarthy: "Elliptical Red Blood Cells in Man", *The Journal of Laboratory and Clinical Medicine*, Volume XIX, March, 1933, page 612.

(43) D. J. Stephens and A. J. Tatebaum: "Elliptical Human Erythrocytes", *The Journal of Laboratory and Clinical Medicine*, Volume XX, January, 1935, page 375.

(44) M. C. Terry, E. W. Hollingsworth and V. Eugenio: "Elliptical Human Erythrocytes", *Archives of Pathology*, Volume XIII, February, 1932, page 193.

(45) E. H. Falconer and L. N. Morris: "A Clinical Comparison of Aplastic Anemia, Idiopathic Purpura Hemorrhagica, and Aleukemic Leukemia Based on Studies of the Bone Marrow", *Medical Clinics of North America*, Volume VI, 1922, page 353.

(46) J. S. Lawrence and R. E. Knutti: "The Bone Marrow in Idiopathic Thrombocytopenic Purpura", *The American Journal of the Medical Sciences*, Volume CLXXXVIII, July, 1934, page 37.

(47) K. Rohr and E. Hafer: "Untersuchungen über postmortale Veränderungen des menschlichen Knochenmarks", *Folia Haematologica*, Volume LVIII, 1937, page 38.

(48) R. P. Custer: "Bone Marrow Biopsy", *The American Journal of the Medical Sciences*, Volume CLXXXV, May, 1933, page 617.

(49) C. Seyfarth: "Die Sternalreparation, eine einfache Methode zur diagnostischen Entnahme von Knochenmark bei Lebenden", *Deutsche Medizinische Wochenschrift*, Volume XLIX, February, 1923, page 180.

(50) R. Isaacs: "Alteration of Tissue Cells in the Blood Stream", *Science*, Volume LXVIII, 1928, page 547.

(51) A. S. Gordon: "Studies in Bone Marrow", *The Journal of Laboratory and Clinical Medicine*, Volume XXIV, January, 1939, page 352.

(52) C. Rhoads and W. Castle: "Bone Marrow in Sprue Anemia", *The American Journal of Pathology*, Volume IX, 1933, page 513.

(53) C. W. Stump: "The Histogenesis of Bone", *The Journal of Anatomy*, Volume LIX, January, 1925, page 137.

(54) E. M. Schleicher and E. A. Sharp: "Rapid Methods for Preparing and Staining Bone Marrow", *The Journal of Laboratory and Clinical Medicine*, Volume XXII, June, 1937, page 949.

(55) G. Ghedini: "Per la patogenesi e per la diagnosi delle malattie del sangue e degli organi emopoietici punctura esplorativa del midollo osseo", *La Clinica Medica Italiana*, Volume XLVII, 1908, page 724; quoted by E. E. Osgood and R. H. Young, *loci citato*.

(56) I. Zadek: "Blood and Marrow in Remissions of Pernicious Anemia", *Zeitschrift für klinische Medizin*, Volume XCIV, 1922, page 67.

(57) F. W. Peabody: "The Pathology of the Bone Marrow in Pernicious Anemia", *The American Journal of Pathology*, Volume III, May, 1927, page 179.

(58) P. Escudero and M. E. Varela: "Estado de la medula ossea en la ictericia hemolitica, antes y despues de la esplenectomia", *Revista Medica Latinoamericana*, Volume XIV, June, 1929, page 1011; quoted by W. F. Cheney and G. Cheney, *The American Journal of the Medical Sciences*, Volume CLXXXVII, February, 1934, page 196.

(59) R. P. Custer: "Studies on the Structure and Function of Bone Marrow", *The Journal of Laboratory and Clinical Medicine*, Volume XVII, July, 1932, page 951.

(60) R. P. Custer: "Bone Marrow in Agranulocytosis", *The American Journal of the Medical Sciences*, Volume CLXXXIX, April, 1935, page 507.

(61) O. P. Jones: "The Reaction of Normoblastic Bone Marrow to Liver Extract", *The Journal of Laboratory and Clinical Medicine*, Volume XXI, January, 1936, page 335.

(62) O. P. Jones: "Cytological Studies of Biopsied Bone Marrow of Pernicious Anemia during a Relapse", *Proceedings of the Society of Experimental Biology and Medicine*, Volume XXXIV, 1936, page 694.

(63) O. P. Jones: "Origin of Neutrophils in Pernicious Anemia (Cooke's Macropolyocytes)", *Archives of Internal Medicine*, Volume LX, December, 1937, page 1002.

(64) W. Dameshek and E. H. Valentine: "The Sternal Marrow in Pernicious Anemia", *Archives of Pathology*, Volume XXIII, February, 1937, page 159.

(65) C. P. Rhoads and D. K. Miller: "Bone Marrow in Anemia", *Archives of Pathology*, Volume XXVI, September, 1938, page 648.

(66) W. Dameshek: "Biopsy of the Sternal Bone Marrow", *The American Journal of the Medical Sciences*, Volume CXC, November, 1935, page 617.

(67) J. Stasney and G. Higgins: "A Cytological Study of the Marrow in the Flat Bones of Man", *Folia Haematologica*, Volume LXI, 1929, page 334.

(68) M. I. Arinkin: "Methodology of Examining Bone Marrow in Live Patients with Hemopoietic Diseases", *Vestnik khirurgii*, Volume X, 1927, page 57; quoted by E. E. Osgood and R. H. Young, *loci citato*.

(69) L. A. Erf and A. Fine: "Serial Blood and Bone Marrow Findings of an Eighth-Month Premature and its Roentgen Ray Treated Chronic Myeloid Leukemic Mother", *The American Journal of the Medical Sciences*, Volume CXCIV, January, 1938, page 5.

(70) T. Tempka and E. Braun: "Das morphologische Verhalten des Sternumpunktes in verschiedenen Stadien der perniziösen Anämie seine Wandlungen unter dem Einflusse der Therapie", *Folia Haematologica*, Volume XLVIII, 1932, page 355.

(71) C. Reich: "A Study of the Diagnostic Value of Sternal Puncture in Clinical Haematology", *The American Journal of the Medical Sciences*, Volume CLXXXIX, April, 1935, page 515.

(72) C. Nordenson: "Studies on Bone Marrow from Sternal Puncture", 1935.

(73) E. E. Osgood and R. H. Young: "Sternal Marrow Aspirated during Life", *Archives of Internal Medicine*, Volume LX, February, 1935, page 186.

(74) L. B. Kingerly, E. E. Osgood and A. H. Ille: "Sternal Puncture", *Archives of Dermatology and Syphilology*, Volume XXXV, May, 1937, page 912.

(75) K. Kato: "Sternal Marrow Puncture in Infants and in Children", *American Journal of Diseases of Children*, Volume LIV, August, 1937, page 209.

(76) P. Vogel and F. Bassen: "Sternal Marrow of Children in Normal and in Pathologic States", *American Journal of Diseases of Children*, Volume LVIII, February, 1939, page 245.

(77) W. Dameshek, H. Henstell and E. H. Valentine: "The Comparative Value and the Limitations of the Trehpene and Puncture Methods for Biopsy of the Sternal Bone Marrow", *Annals of Internal Medicine*, Volume XI, November, 1937, page 801.

(78) J. Stasney and G. M. Higgins: "Quantitative Cytologic Study of the Bone Marrow of Adult Dogs", *The American Journal of the Medical Sciences*, Volume CXCII, April, 1937, page 462.

(79) A. Maximow: "Experimentelle Untersuchungen zur postfötalen Histogenese des myeloiden Gewebes", *Beiträge zur pathologischen Anatomie und zur allgemeinen Pathologie*, Volume XLI, 1907, page 122; quoted by W. Dameshek, H. Henstell and E. H. Valentine, *loci citato*.

(80) E. Segerdahl: "Über Sternumpunktionen", *Acta Medica Scandinavica*, Supplement LXIV, 1935, page 1.

(81) R. P. Custer and E. Krumbhaar: "A Note on Differential Cell Counts of Bone Marrow", *The American Journal of the Medical Sciences*, Volume CLXXXIX, May, 1935, page 630.

(82) S. Varadi: "L'infiltration lympho-granulomateuse du sternum. Sur un cas de maladie de Hodgkin diagnostiquée par ponction sternale", *Sang*, Volume XII, 1938, page 106.

#### AN OPERATION FOR ANKYLOSING THE KNEE JOINT.

By N. D. ROYLE, M.D., Ch.M., F.R.A.C.S.,  
Sydney.

THE failure to obtain bony union and the subsequent development of flexion deformity that followed ordinary excision of the knee joint led me to introduce the following operation. I have practised it for about fifteen years without a failure. The femur and tibia are united in twelve weeks; but my patients have worn a Thomas knee splint usually for three months after removal of plaster. The condition for which I have employed the operation is a flail knee following anterior poliomyelitis. This operative treatment obviates the wearing of apparatus which has to be renewed and is heavy and expensive.

The steps in this operation for ankylosing the knee joint are as follows.

*Step I.*—A U-shaped incision is made, extending from the inner side of the knee joint across the patellar tendon to the outer side of the knee joint. The lateral parts of the incision extend about three inches proximal to the line of the knee joint.

*Step II.*—Dissection is made, exposing the patellar tendon, which is cut through. The capsule is cut in the line of incision and the patellar flap is thrown upwards. When the knee joint is exposed the menisci are removed, but the cruciate ligaments are left intact.

*Step III.*—With a broad-bladed osteotome a thin slice of bone is removed from the lower end of the femur and from the upper end of the tibia. Just enough bone is removed to allow bony contact. Then the osteotome is made to cut both the femur and tibia together, across the gap between the two (Figure I).

*Step IV.*—A sliding graft is thus made and the bone is transferred from the femur across the gap between the femur and the tibia, and then hammered into position (Figure II).



FIGURE I.  
Showing step III of the operation.

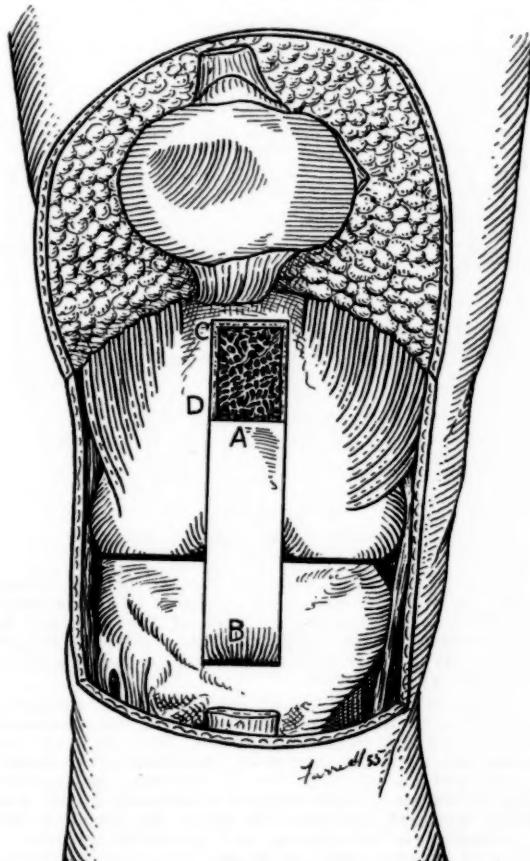


FIGURE II.  
Showing step IV of the operation.

Step V.—The piece taken from the tibia is hammered into the upper section of the cut (Figure III).

The whole operation is done with a tourniquet in position and the wound is closed without drainage.

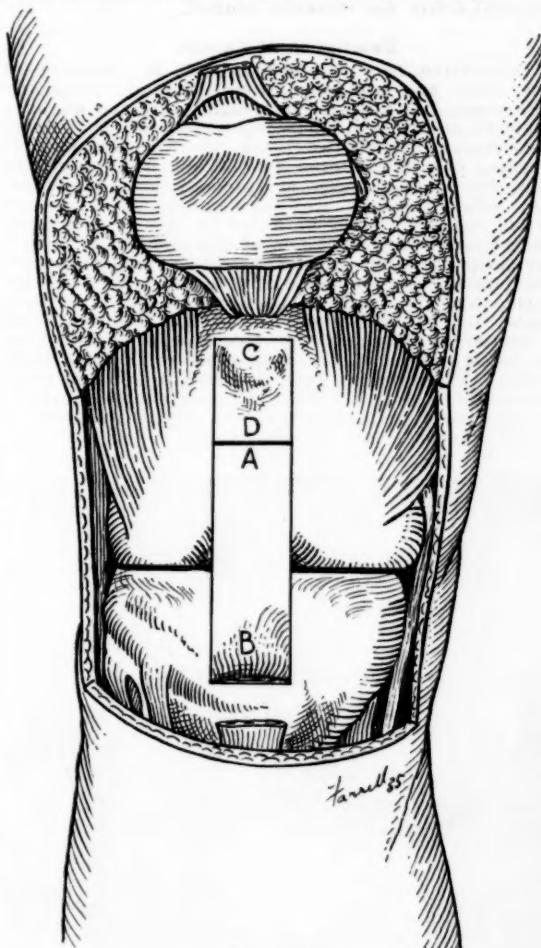


FIGURE III.  
Showing completed bony part of the operation.

The patient is nursed for twenty-four hours with the leg elevated so as to minimize bleeding from the cut surfaces of the bones. The limb is enclosed in plaster of Paris for twelve weeks.

### Reports of Cases.

#### CONGENITAL ABSENCE OF PECTORAL MUSCLE.

By DAVID B. ROSENTHAL, M.D. (Melbourne), M.R.C.P.,  
Medical Superintendent, Gresswell Sanatorium,  
Mont Park, Victoria.

CONGENITAL absence of muscles, either singly or in groups, is very rare; the pectorals are most commonly affected.<sup>(1)</sup>

Recently, cases of congenital absence of pectoral muscles have been reported by Jokl<sup>(2)</sup> and Parhad.<sup>(3)</sup> Jokl's two patients are young men, of athletic type, who appear to

have suffered no disability from the anomaly. It is not clear from the description whether, in the cases described, the condition is unilateral or bilateral. Parhad's patient (illustrated) is a young lad, of spare build, with this unilateral defect, but otherwise normal.

#### Description of Patient.

The condition here described was seen in a middle-aged man who was suffering from bilateral pulmonary tuberculosis. He was aged forty-eight years and was of a well-built, sturdy type, weighing nine stone one pound; his height was five feet two inches. There was considerable flattening over the anterior part of the left side of the chest, due to the absence of *musculus pectoralis major*. The sterno-costal part was missing, but the clavicular portion was represented by a few strands of contractile tissue inserted into the fascia of the arm and forming a very shallow anterior wall for the axilla. There was little subcutaneous tissue associated with the breast, but the nipple, although slightly elevated compared with the right nipple, was normally formed. No fibres corresponding in position to the *musculus pectoralis minor* could be felt. The posterior wall of the axilla appeared to be normally formed. There was no gross abnormality of other structures in this region, and radiographic examination revealed no abnormal bone formation of the thorax, the clavicles or the shoulder joints.

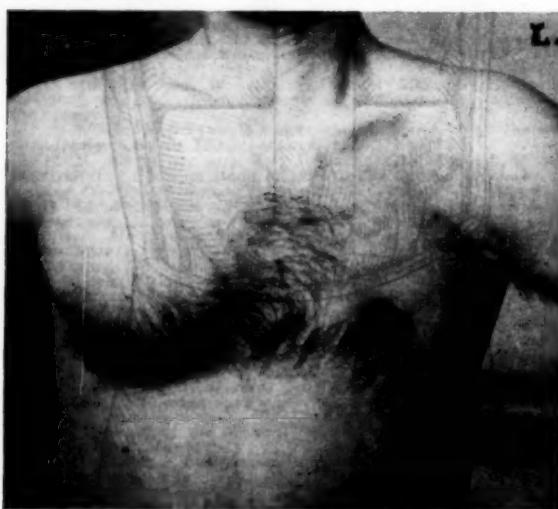


FIGURE 1.

There was, however, noticeable "bossing" at the chondrosternal junctions of the first to fifth ribs on the left side. Scoliosis of the thoracic section of the spine was also present, with convexity to the left in the upper dorsal region and to the right in the lower dorsal region. These suggest unusual anatomical stresses associated with the defect in musculature.

Full movements of the left arm, with full power, were present, both adduction and flexion being normal. The patient had always done the ordinary work of a labourer.

As the patient gained in weight (49 pounds' increase in nine months), the difference between the right and left "breast" regions became more pronounced, the right side filling out, whilst the flattening of the left side remained. As the photograph shows, the development of hair on the left side was incomplete; but axillary hair was well formed. Sweating occurred on both sides equally.

There was no history of any illness resembling poliomyelitis, nor any evidence of neurological or muscular disease. The patient had noticed no alteration in the condition, which had "always been present".

As might be expected, there was noticeable difference in the degree of radiotranslucency, in the skiagram of the

chest between the right and left sides, as the *musculus pectoralis major* normally veils the lateral part of the upper half of the chest.

#### Comment.

Congenital absence of muscles appears to have received scant attention in the literature, and even the standard text-books dismiss the subject without adequate explanation of the exact nature of its cause.

In 1902 Bing<sup>(1)</sup> reported, with illustration, a case of congenital absence of the *musculus pectoralis major* on the right side, the clavicular part being present. No functional defect was apparent. The patient died later, and autopsy examination revealed that the *musculus pectoralis minor* was also absent.

In this article Bing reviewed previous reports of muscle defects. He gave the following figures for the number of instances in which various muscles were affected: the pectoral muscles, 102; the trapezius, 18; the *quadratus femoris*, 16; the *serratus anterior*, 14; the omohyoid, 8; the semi-membranosus, 7; the abdominal muscles, the gemelli, the deltoid and the *latissimus dorsi*, each 4; the sterno-cledo-mastoid, rhomboids, supraspinati and infraspinati, *biceps brachii*, each 3; the small muscles of the hand, the *quadriceps femoris*, the *platysma*, and the *extensor carpi ulnaris*, each 2; several other muscles were affected each in one case. Bing commented on the striking predominance of defects in the muscles of the thoracic region, even allowing for the more obvious appearance of some of these during life. He suggested that such defects might be related in some way to the muscle dystrophies, in which the larger muscles are more commonly affected.

#### Acknowledgement.

I desire to acknowledge my thanks to Dr. R. A. Willis for his assistance in reviewing the literature.

#### References.

- <sup>(1)</sup> R. Bing: "Ueber angeborene Muskeldefekte", *Archiv für pathologische Anatomie und Physiologie*, Volume CLXX, 1902, page 175.
- <sup>(2)</sup> E. Jokl: "Congenital Absence of Pectoral Muscle", *The British Medical Journal*, Volume I, June 3, 1939, page 1156.
- <sup>(3)</sup> E. Kufmann: "Pathology for Students and Practitioners", Volume III, 1929, page 2034; translated by G. P. Reimann.
- <sup>(4)</sup> M. B. Parhad: "Congenital Absence of Pectoral Muscles on One Side", *The British Medical Journal*, Volume I, April 15, 1939, page 775.

#### PNEUMOCOCCAL SEPTICÆMIA: SUCCESSFUL TREATMENT WITH "M & B 693".

By A. R. SOUTHWOOD, M.D.,  
Honorary Physician, Royal Adelaide Hospital,

AND

A. R. MAGAREY,  
Medical Student, University of Adelaide.

PNEUMOCOCCAL SEPTICÆMIA is not a common clinical condition. It is true that in most cases of lobar pneumonia, especially during the early stages of the infection, the pneumococcus can be cultivated from the blood; but this bacteræmia is a transient state and is not designated ordinarily as septicæmia.

It happens occasionally that complications of pneumonia may cause bacteræmia to persist after the pneumonic consolidation has resolved, and the occurrence of small pulmonary abscesses, empyema, infection of mesenteric glands, and endocarditis may in this way be associated with septicæmia. There is also a cryptogenic group: cases of pneumococcal septicæmia in which the portal of entry of infection is not known and in which evidence of infection of any organ or fixed tissue may be lacking. An example of this cryptogenic group recently came to our notice and is worthy of record.

**Clinical History.**

The patient, a man, aged sixty-three years, was a native of Stockholm, Sweden. He was a metal spinner by trade. He left Sweden as a young man and led a seafaring life for several years. He later spent some years in South Africa and was ill with malaria in Cape Town in 1911. In 1912 he came to Australia and had no malarial attacks since that time.

In 1933 he was troubled occasionally by giddy turns, especially on exertion, and anginal pains. These symptoms were attributed to sclerosis of the coronary vessels.

Apart from these disturbances he remained in fair health till May, 1939, when he had "influenza". He kept to his bed for three weeks. He reported at the out-patient department at the end of May, 1939, complaining of shivering feelings, hiccup, abdominal pains and general weakness. He said he had no appetite and could not be "bothered about anything". On September 26 he reported having had a "terrible perspiration" during the previous night, and said that he had shivered for fifteen minutes. Shortness of breath was evident on slight exertion. It was on October 3, while he was waiting to be seen at the out-patient department, that he was overcome by an attack of very severe shivering. He appeared cold and blue. His temperature was not elevated, nor did he lose consciousness. He was admitted to hospital for further observation.

General physical examination did not reveal any abnormality beyond the usual accompaniments of a febrile illness. No signs of pulmonary disease were observed. As indicated in the temperature chart, a succession of rigors occurred. In the apyrexial intervals the pulse rate varied between 60 and 80 per minute; at the height of some of the rigors the rate was over 100. The systolic blood pressure was 110 millimetres of mercury and the diastolic pressure 65. The respiration rate reached 48 per minute during some of the rigors, but in the intervals was normal. Blood examination showed a red cell count of 5,300,000 per cubic millimetre, and a white cell count of 16,000 per cubic millimetre, mainly polymorphonuclear cells. The blood urea nitrogen content was 13 milligrams per 100 cubic centimetres.

In view of the history of malaria, several blood films were taken, most of them at the onset of the rigors, which occurred during the few days after the patient's admission to the ward. In no film were any parasites found.

During the first week, while the investigations were proceeding, the patient was not submitted to any special line of treatment beyond the ordinary nursing procedures. The rigors continued at irregular intervals and night sweats were frequent. Sometimes two rigors occurred in the one day; on other occasions no rigors would occur for twenty-four hours or more. The pyrexial peaks varied from 100° to 104° F.

Agglutination tests of the blood plasma were carried out against *Bacterium typhosum* (H and O suspensions), *Bacterium paratyphosum* B, *Proteus* X19, and *Brucella abortus*, all with negative results. The Wassermann test of the blood revealed no reaction.

An electrocardiographic examination indicated some myocardial damage. An X ray examination of the stomach, made while the patient was under observation at the out-patient department, showed the organ to be of the "leather-bottle" type. X ray examination of the chest showed a small and irregular calcified area at the base of the right lung, possibly an old tuberculous lesion; the film showed no evidence of active tuberculosis nor of other pulmonary disease. The heart shadow was not enlarged.

Throughout the illness no abnormal signs were found on clinical examination of the chest. The spleen was not palpable. No urinary abnormality was detected during the illness, and all microscopic examinations of the urine revealed no abnormality.

While the result of the bacteriological examinations of the blood by culture methods was being awaited it was decided to give quinine for a few days as a therapeutic test. This appeared to have no influence on the clinical condition of the patient nor on the temperature course. Indeed, severe rigors occurred on October 17 and 18, 1939,

and the patient's general condition became much worse; the pulse was weak and rapid, reaching 130 per minute, and vomiting occurred on several occasions. The administration of quinine was stopped.

When the report was received from the laboratory that pneumococci had been cultivated from the blood, treatment with "Dagenan" ("M & B 693"), in a dose of 1-0 grammie every four hours, was begun. After nine grammes had been taken the patient was so troubled by nausea and hiccup that oral administration was interrupted. Three intramuscular injections of "Dagenan Sodium", the soluble sodium salt of "M & B 693", were given. By this time the temperature had fallen to normal and the patient's general condition was much better. Tablets were again given orally (1-0 grammie every eight hours). During the week a total amount of 20-5 grammes of "Dagenan" was given, 17-5 grammes by the oral route and 3-0 grammes by intramuscular injection. Except for one rigor on October 18, no shivering attacks occurred during the period of "Dagenan" administration nor during the succeeding week. Hiccup and nausea persisted for a few days, and on their clearance the patient felt quite well.

The temperature remained normal until the night of October 30, when it rose to 99.4° F. There was no rigor at that time; but on the next day a definite rigor occurred, followed by pyrexia to 104.6° F. Further specimens were taken for blood culture and the administration of "Dagenan" tablets (1-0 grammie every four hours) was resumed. Although some nausea occurred the patient was able to tolerate the tablets for four days; during that time he received a total of 17-0 grammes. The temperature fell to normal on the resumption of treatment and no rise has since been recorded.

From the blood obtained on October 31, Type III pneumococci were cultivated. Blood examination on November 1 showed a red cell count of 4,300,000 and a white cell count of 6,500 per cubic millimetre, the haemoglobin value being 87% and the colour index 1.0. Further radiological examinations of the chest showed no change. An attempt at blood culture on November 20 produced no growth.

Apart from the occurrence of a small carbuncle on the back of the neck, the patient's convalescence proceeded without incident. He reported to the follow-up clinic on January 9, 1940, and said he still felt rather weak, but was otherwise in good health. There had been no further rigors nor any recurrence of nausea, vomiting or hiccup. He appeared to be well.

**Discussion.**

1. An example of cryptogenic septicæmia is here reported. Probably in all cases of septicæmia there is a local focus of infection from which the general spread has occurred. A careful search for the portal of entry is necessary. The relation of "influenza" to the septicæmia in this case is uncertain. When the portal through which the bacteria have entered the blood is not known it is better to label the illness cryptogenic, rather than primary, septicæmia.

2. In the bacteriæmia of the early stages of pneumonia, pneumococci may be cultivated from the blood. When pneumococcal septicæmia occurs, it generally follows a definite illness, such as pneumonia. In cryptogenic pneumococcal septicæmia some small undetected pulmonary lesion is often the source of infection. The mortality rate in cryptogenic pneumococcal septicæmia is high.

3. In the case recorded the pneumococci were of Type III. Infection with Type III organisms is reported by authorities to have the highest fatality rate of all pneumonias.

4. In septicæmia of this type the temperature is commonly irregular, with chills or rigors, and sharp exacerbations of fever. In some cases the fever may be intermittent, there being a fairly regular evening elevation of temperature.

5. The use of "M & B 693" in pneumococcal infection is now a well-established practice. It is the recognized treatment for lobar pneumonia. Many patients suffering from pneumococcal meningitis have been successfully treated. No record of a case of cryptogenic pneumococcal

septicæmia treated by this means has come to the notice of the writers.

6. In some cases it may be difficult to give adequate amounts of "M & B 693", owing to gastric intolerance. The soluble sodium salt of "M & B 693", administered by intramuscular injection, is a valuable help in such cases. The dose is 3.0 cubic centimetres of the 33% solution given every four hours till three or four doses have been given. One gramme of the soluble preparation, given by intramuscular injection, is equivalent to about 2.0 grammes of "M & B 693" given by mouth.

7. The soluble preparation is given by intramuscular injection and not subcutaneously. Intravenous injections may be given. In the present instance intramuscular injection was followed by no discomfort or painful reaction.

8. In the treatment of pneumococcal infections with "M & B 693" the question of dosage is important. To give too little may result only in temporary abatement of the illness, and a serious relapse may follow. To give too much may expose the patient to risks of toxic effects of the drug. The physician's duty in such cases is to steer a safe middle course—*primum non nocere*.

9. The chart reproduced illustrates the main features of the case here reported. The delay in instituting treatment with "M & B 693" has enabled a satisfactory "before and after" comparison to be made.

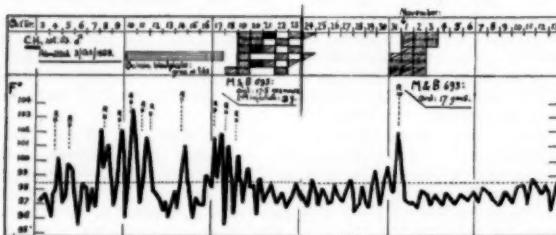


FIGURE 1.

Pneumococcal septicæmia. The chart illustrates the effect of "M & B 693". Each shaded small rectangle represents 1.0 gramme of the drug, and each small triangle 0.5 gramme. Each black rectangle represents 1.0 gramme (ampoule of 3.0 cubic centimetres) of "M & B 693 Soluble".

10. The use of "M & B 693" in a case of cryptogenic pneumococcal septicæmia was promptly followed by improvement and eventually by complete recovery.

#### Acknowledgement.

The laboratory examinations herein described were carried out at the Institute of Medical and Veterinary Science, Adelaide. The writers are grateful to the Director and his staff for their valuable cooperation.

### Reviews.

#### EXERCISE.

"THE PHYSIOLOGY OF EXERCISE", by J. H. McCurdy and L. A. Larson, has reached a third edition, so there must be a demand for it.<sup>1</sup> It is difficult, however, to see what students of physical education, for whom it is written, will get from such a book. There is an immense amount of information in the book on various aspects of physiology which might have a bearing on physical education, but it is in a very ill-digested form. A large part of the book is made up of snippets of information collected from very extensive reading; but there is little evidence of critical selection and even less assessment of the relative value of the selections. As a result, inconsistencies of

<sup>1</sup> "The Physiology of Exercise: A Text-Book for Students of Physical Education", by J. H. McCurdy, A.M., M.D., M.P.E., and L. A. Larson, B.A., B.P.E., M.Ed., Ph.D.; Third Edition, thoroughly revised; 1939. Philadelphia: Lea and Febiger. Medium 8vo, pp. 349, with illustrations. Price: \$3.75 net.

statement are frequent. While the authors undoubtedly understand the difference between "normal" and "average", they do not always make the distinction. For example, after a careful discussion on the variability of heart rate among normal individuals, we find this type of statement many times: "A study of 1,633 male students at the University of Minnesota gave their normal pulse as 80-177."

While much of the data collected are interesting in themselves, their relation to exercise and physical education is too frequently not made clear. The second part of the book deals with the effects of special types of exercise upon bodily function. Here a great deal of useful information is collected and the authors are obviously on more familiar ground. The third part deals with methods of indicating efficiency of bodily function. Various tests for efficiency are discussed and a so-called "organic efficiency test", devised by the authors, is set out in detail.

The book is a mine of information for a reader with a sound knowledge of physiology, but would not be very useful and might even be dangerous for the untrained student.

### TRAUMA AND NEW GROWTH.

DR. R. J. BEHAN's book, "Relation of Trauma to New Growths: Medico-Legal Aspects", is a very ambitious attempt to deal with an extremely difficult subject in a way which will make it clear to members of the legal and medical professions.<sup>2</sup> Our general impression of this book is not favourable. The medico-legal aspects are well handled, but the pathological part of the work is not good and should be rewritten by a pathologist. We cannot seriously regard the work of a man who describes the brain as a mesoblastic tissue, who writes of Hodgkin's disease changing into cancer of the tongue and who confuses Ewing's tumour with multiple myeloma. In many parts of the work the reasoning is difficult to follow. The author is verbose and he makes ambiguous statements. If this book is to be of any value it should be condensed and completely rewritten.

### Notes on Books, Current Journals and New Appliances.

#### A MEDICAL DICTIONARY.

THE fourteenth edition of "Stedman's Medical Dictionary" has appeared.<sup>3</sup> This is a standard work and should be on the desk of any medical graduate who does much reading or medical writing. Dr. T. L. Stedman, who has always been responsible for this work, died at the age of 84 while he was preparing this edition for the printer. The editorship has been taken over by his nephew, Dr. S. T. Garber, though the book will still bear Stedman's name. Names of certain chemical compounds, hormones and so on have been added and some of the older illustrations have been omitted. Apart from its value as a first-rate dictionary this book has several useful appendices. Perhaps most important of the addenda is a list of the terms suggested by the Anatomical Society of Great Britain and Ireland which are set out in columns with the Latin equivalents and the Basle Anatomical Nomenclature. The table of drugs with their doses and uses should also be useful. Those who use this dictionary, however, must be prepared for the American spelling. This book has been found most useful in the work of this journal and it can be recommended to medical practitioners with the greatest confidence.

<sup>2</sup> "Relation of Trauma to New Growths: Medico-Legal Aspects", by R. J. Behan, M.D., Dr.Med. (Berlin), F.A.C.S.; 1939. London: Baillière, Tindall and Cox. Medium 8vo, pp. 437. Price: 22s. 6d. net.

<sup>3</sup> "Stedman's Practical Medical Dictionary", by T. L. Stedman, A.M., M.D., and S. T. Garber, B.S., M.D.; Fourteenth, revised. Edition; 1939. London: Baillière, Tindall and Cox. Super Royal 8vo, pp. 1316, with 23 plates and numerous illustrations. Price: 37s. 6d. net.

## The Medical Journal of Australia

SATURDAY, MARCH 23, 1940.

*All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.*

*References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.*

*Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.*

### THE MEETING OF THE FEDERAL COUNCIL.

THAT the meetings of the Federal Council of the British Medical Association in Australia should engage the earnest attention of every member of the Australian Branches is a view that has been consistently advanced in the pages of this journal. Some of the subjects that come up for discussion are hardy annuals, but their very hardness is often an indication of the difficulties that they present. Members of the several Branches do not perhaps realize either that unity, or at least uniformity of action, is necessary in matters affecting the health of the nation or the welfare of the profession, or that the Federal Council has to legislate to meet the divergent conditions of six separate States, in no two of which can the relationship of the profession to the public or the profession's own conception of its duties and privileges be said to be identical. Much is being done, and perhaps the most notable achievement of the Federal Council is the growing trust and tolerance that are displayed by different Branches in their relations with one another. This comes from increased understanding, and for this reason members of the Branches are

asked to read the report in this issue of the meeting of the Federal Council recently held at Melbourne, to note the implications of the subjects discussed, and to take counsel with one another about them at their Branch meetings.

As was to be expected, consideration of certain items on the agenda paper was deferred on account of the war. On the other hand, much time was spent on the subject of the army medical services, on the supply of journals to medical practitioners on active service, and on the provision of a medical service for the nation. Taking the last of these three subjects first, we would remind readers that for some time the Federal Council, following the example of the Parent Body in England, has tried to draft a scheme for a general medical service. A month or two ago we pleaded for the making of plans that would enable the medical profession to take the lead in adapting the medical practice of the future to the changing face of society and its altered needs. At the dinner given by the Council of the Victorian Branch of the Federal Council at the time of the recent meeting in Melbourne, Sir Henry Newland, the President of the Federal Council, stated his conviction that there was need to look ahead and to plan for the future. The Federal Council has appointed a subcommittee to report on a pamphlet, "Planning for Health", that has been drafted, and to report to its next meeting. This subcommittee has a heavy responsibility and it is to be hoped that its members will not restrict their vision to the immediate needs of the future. No one can tell what changes the end of the war will bring, and the more extensive the planning and the wider the vision displayed at the present time, the better.

The question of the supply of medical journals to members on active service is one that affects this journal in no small degree. The points at issue are clearly set out in the report of the meeting. At the dinner already referred to, Dr. T. W. Lipscomb, the Chairman of the Australasian Medical Publishing Company, Limited, recounted the hardships and difficulties that had to be overcome by this journal during the war of 1914-1918 in the matter of paper and printing costs. Since that time the

cost of the journal to members has not increased and the Australasian Medical Publishing Company, Limited, has been able to found a printing and publishing house that will some day be the property of the Branches of the British Medical Association in Australia, unencumbered by debentures and the necessity for paying interest on them. That the financial depression was weathered and that the directors have been able to fulfil their obligations by redeeming the debentures of deceased debenture holders, when required to do so in accordance with the terms of issue, is no mean accomplishment. At present this journal is faced with the prospect of having to meet loss of revenue and increased costs; but, as the Chairman of Directors assured the members of the Federal Council and of the Victorian Branch Council, every endeavour will be made to meet the need without an appeal to members of the Branches for an increase in the annual *per capita* payment. In the meantime we would express the hope that members of the Australian Branches on active service will continue to receive the journal and will communicate their medical and surgical experience through its pages to those who remain at home.

Of the matters not connected with the war that were dealt with at the meeting, the most important was probably the drafting of a new model friendly society lodge agreement that will be uniform for all States of the Commonwealth. This is a document that is long overdue, and the occasion of its drafting is one in which all the wisdom and experience of the several Branches should be pooled. Happy relations and smooth working that are enjoyed in one centre can be attained in another if there is a will to their attainment. The most careful consideration was given to every clause of the proposed new agreement, and it is to be hoped that it will be acceptable to the Branches. We would bear witness to the fact that in drafting the agreement the Federal Council gave consideration to the needs of both lodge member and lodge doctor; and we believe that this will be clear to both the members of the medical profession and the central body of the friendly society organization when the time comes for them to consider it together.

Another matter, not mentioned in our report of the meeting, was the announcement by the General Secretary that the New South Wales Branch had decided to establish a department of medical sociology and research. This new departure, which was welcomed by the members of the Federal Council, will be the subject of editorial comment on a subsequent occasion.

In conclusion we would once again point out to members that Federal councillors travel long distances and give freely of their time and energy in the service of the profession. Such self-sacrifice demands at least an interest in what is attempted and what is achieved.

### Current Comment.

#### MYCOBACTERIAL INFECTION OF WILD ANIMALS.

It seems that no creature that walks, crawls, swims or flies is immune to attack by at least one of the several types of tubercle bacillus. It has long been recognized that various domestic animals and wild animals in captivity are subject to tuberculosis; but it has not been generally known that under suitable conditions the tubercle bacillus may cause widespread disease among untamed creatures in their natural haunts. Infection of wild animals with acid-fast bacilli has been discussed recently by A. Stanley Griffith.<sup>1</sup> He remarks:

A few years ago, apart from occasional instances of casual tuberculosis and the comparatively rare condition known as rat-leprosy, infections with acid-fast bacilli were not known to occur in wild animals living free.

This group of organisms is responsible for more widespread morbidity and mortality among human beings and animals, and causes greater economic loss than any other single group of bacteria.

He points out that the bovine tubercle bacillus has a "wider range of pathogenicity" than the human and is responsible for most of the serious tuberculous disease of domestic animals and a considerable amount of the disease in man. The avian type of tubercle bacillus, which depends on poultry for its continued existence, has not been found in tuberculous lesions in man in Great Britain. It is apparently of no great importance in human pathology; but, as it can produce lesions in the pig, sheep, goat, ox and horse, its pathogenicity to man might not unreasonably be regarded as a possibility.

Griffith states that tuberculosis caused by recognized types of tubercle bacilli is unknown in wild animals living entirely free from any contact with man. He mentions that the first tuberculous wild animals that he saw were adult rhesus

<sup>1</sup> *Proceedings of the Royal Society of Medicine*, September, 1939.

monkeys that had been recently captured in the Indian jungle. From the appearance of the lesions it was practically certain that they had been infected prior to their capture. But, as rhesus monkeys in India visit the temples and shrines in search of food and are not molested, the infection was probably of a human source. A further argument in favour of this is that young monkeys captured in the same regions are usually free of the disease.

Rats and mice caught in poultry yards have been found to be infected with the avian bacillus. This suggests the possibility that rats and mice may convey the infection from one poultry run to another. These animals have also been shown to be carriers of the bovine bacillus. Probably they have less opportunity of becoming infected with the human type; but there can be no doubt that they do become so infected when conditions are suitable.

Many different species of wild birds have been found to be infected with the tubercle bacillus. "The birds acquire the tuberculous infection, which is always due to avian bacilli, on visits to poultry runs, or through eating garbage or dead tuberculous fowls." Griffith points out the importance of preventing wild birds from visiting poultry runs and feeding with the fowls. It is of interest to note that tuberculosis in wild pigeons has never been observed. This "is in harmony with the fact that tame pigeons, though susceptible to infection with avian bacilli, are much less so than fowls".

Tuberculosis is very common among wild animals held in captivity. The most susceptible are the primates, the next being the ungulates. Pulmonary disease is common in monkeys and can apparently be transmitted directly from one animal to another. Griffith mentions the close resemblance between tuberculous lesions in monkeys and in the child. He points out that the avian type of organism is not virulent to apes or monkeys, producing either no lesions at all or only trivial ones. Various carnivorous animals in captivity have been found to be infected with tubercle bacilli. It is remarkable that the domestic cat is highly susceptible to infection with bovine bacilli and very resistant to human bacilli; in fact human organisms can be given to the creature with its food, without causing disease. Cats, living as they often do in intimate contact with man, must be a source of danger to children; for in many places they have ample opportunity of becoming infected with the bovine organism.

Tuberculosis is not a common disease of marsupials. But this may be because there are few marsupials in captivity rather than because they are not highly susceptible. Kangaroos, wallabies and kangaroo-rats have been found to be infected. In a series of five cases investigated bacteriologically in the London Zoo, the avian bacillus was found in four. This organism is able to produce extensive lesions in marsupials.

Birds of various kinds, including ducks and geese, in zoological gardens, are subject to

tuberculosis, the infecting organism being of the avian type. Parrots in zoological gardens are rarely affected; but when kept as domestic pets they are liable to a peculiar form of cutaneous tuberculosis, mostly in the eyelids, at the root of the beak, and on the ears. The infecting organism in these cases is of the human type. It is transmitted by intimate contact. Fish, amphibians and reptiles are all liable to infection with acid-fast bacilli, which are present in the lesions in great numbers. Tuberculosis is apparently rare. Rat leprosy is caused by *Mycobacterium leprae muris*. It "is characterized by the deposition in the subcutaneous tissues of greyish-white granular material composed largely of acid-fast bacilli which by pressure eventually causes atrophy of the underlying muscles and of the skin, leading to the formation of indolent discharging ulcers". The internal organs are apparently rarely affected. The disease is world-wide. It is not naturally transmitted to other animals and cannot be experimentally produced in guinea-pigs, rabbits or monkeys.

Perhaps the most interesting of all these infections with acid-fast bacilli is the widespread disease among field voles discovered by Wells in 1937. The lesions resemble those of tuberculosis to macroscopic examination. The causal organism has been cultivated on an artificial medium and has been found by Griffith to differ "both in cultural characteristics and in virulence from any of the three established types of tubercle bacilli".

These infections of animals with acid-fast bacilli are of more than academic interest, as a moment's consideration of the tuberculous cutaneous lesions of parrots, for example, will show. Many of the other infections have no apparent association with human disease; but who can say what avenues to a truer understanding of human disease the study of them might reveal? Work such as Griffith's is to be commended and encouraged.

#### AN HONOUR FOR DR. C. H. KELLAWAY.

THE members of the medical profession of the Australian Commonwealth, together with workers in the wider sphere of science, heard with much satisfaction of the election of Dr. Charles H. Kellaway, Director of the Walter and Eliza Hall Institute of Research in Pathology and Medicine, to a Fellowship of the Royal Society. Many of Dr. Kellaway's writings are known to readers of this journal. His research has been devoted to the venoms of Australian snakes, the liberation of histamine in tissue subjected to injury, hydatid antigens, anaphylaxis and other subjects. We remember with appreciation his article on medical research contributed to the Silver Jubilee number of this journal. The medical profession of Australia offers its congratulations to Dr. Kellaway and hopes that he will continue for many years to come to shed lustre on medical science in Australia.

## Abstracts from Current Medical Literature.

### RADIOLOGY.

#### Calcification in the Splenic Region.

ARNOLD BACHMAN (*American Journal of Roentgenology*, June, 1939) states that when calcified aneurysmal dilatations of the splenic artery are present they appear as ring-like shadows which are quite dense. Small sections of the circumference are frequently invisible and usually represent the sites of junction of the lumina of the afferent and efferent parts of the vessel with the lumen of the aneurysm. The centre of the circular shadow is always less dense than the periphery. The calcified aneurysm may be seen anywhere in the course of the artery, extending from its origin in the mid-line across the left hypochondrium into the shadow of the spleen. Parallel double linear shadows of the calcified artery are often seen leading into and away from the dilatation. Such an appearance is pathognomonic. Concomitant calcification in the aorta is frequently observed. Occasionally other abdominal vessels also show calcium deposition. On the other hand, only the aneurysm may have the incrustations and be visible on the skiagram, neither the remainder of the splenic artery nor the aorta being demonstrable. Röntgenographic differentiation of the condition from a calcified renal artery and a small non-parasitic cyst of the spleen may offer great difficulty.

#### Röntgenological Manifestations of Pulmonary Embolism.

JOSEPH JELLEN (*American Journal of Roentgenology*, June, 1939) points out that infarction need not necessarily and does not always follow embolism. Consequently it must be expected that X ray examination of the lungs will reveal no abnormality in a moderate number of clinically recognized cases of pulmonary embolism. It is only when infarction of the lung takes place that it is possible to obtain secondary radiological evidence of the presence of a pulmonary embolus, which itself is not demonstrable. Secondly, an examination made just after the onset of an attack may reveal no evidence of infarction, whereas a film made a few days later will reveal the infarct quite readily. Pulmonary infarcts present a considerable variation in their radiological appearance. When typical, they appear as pyramidal or wedge-shaped areas of increased density, with their bases towards the periphery of the lobe; but only a small proportion of infarcts show the typical pyramidal form. Many present shadows of indefinite and irregular

outline. There is frequently so much surrounding inflammation that an infarct may not be distinguishable from a pneumonic process. With large emboli, areas of increased density appear at the base of the lung, the margins of which are very clearly defined. The shadows of infarcts are not so dense as those seen in pneumonia. Associated pleural changes take place and become very pronounced. There is an accentuation of the hilar shadows on the side of the embolus, due evidently to the dilatation of the pulmonary vessels. The shadows representing infarcts may vary a great deal in duration. Large infarcts and those accompanied by considerable pleural reaction persist the longest. Small infarcts resolve rather quickly, even within a period of a few days. Shadows representing infarcts resolve more slowly than patches of pneumonia of the same size.

#### Late Extruterine Pregnancy Diagnosed by Soft Tissue Radiography.

WILLIAM SNOW (*American Journal of Roentgenology*, April, 1939) reports two cases in which a correct diagnosis of extruterine pregnancy was made without the aid of contrast substances. The Röntgen procedure necessitates an ordinary antero-posterior view and a right and left lateral view. In a normal case, on X ray examination the uterine wall is seen to surround the fetus completely. In most cases its actual thickness can be noted, particularly opposite the placenta. The latter occupies about one-third of the surface of the uterine wall, the shadows of both appearing as one where they meet. The small parts of the fetus almost invariably face the placenta, and where they come in contact, the placenta, being very soft, gives, showing pressure defects. The subcutaneous fat of the fetus can easily be seen at these points and serves to demarcate the placenta from the fetal parts. Even moderate increases in amniotic fluid can be detected. When an extruterine pregnancy is present the shadow of the uterine wall is absent over the fetus. The shadow of the amniotic sac may be seen. Another sign suggestive of extruterine pregnancy is the occurrence of a pressure defect on the upper wall of the urinary bladder by the uterus, which is smaller than it should be for the period of gestation.

#### Bone Changes in Haemolytic Anaemia and Leucæmia in Children.

C. G. TEALL (*British Journal of Radiology*, November, 1939) states that in leucæmia the earliest change found on radiographic examination occurs in the long bones. There is a streaky type of bone absorption which may not be very pronounced and which is more obvious in some

bones than in others. The long bones show different manifestations, varying from this early change to gross alterations in bone structure, which are quite pathognomonic of the disease. Thus they may show some generalized osteoporosis, sometimes to an extreme degree, and the leucæmic metaplasia and hyperplasia of the bone marrow gradually produce cortical absorption of an irregular type, exactly as would be expected from the irregular distribution of the leucæmic tissue seen at autopsy. The degree of bone absorption may be so great that pathological fractures may occur. The leucæmic metaplasia may in some cases occur under the periosteum of the long bones, in which event the radiograph shows periosteal layering such as is seen in other conditions in which the periosteum is separated from the shaft of the bone. Sometimes another type of bone change is found, the explanation of which is not quite apparent. This change is not found exclusively in leucæmia, but when present is extremely suggestive. It consists of a narrow band of lessened density, seen in the metaphysis of the long bones immediately behind its extremity, which is quite irregular in outline. The appearance is reminiscent of that found in scurvy, except that there is no area of increased density at the extremity of the metaphysis immediately in front of it.

#### Bone Rarefaction after Trauma to Large Joint Regions without Fracture.

H. L. JAFFE (*Radiology*, September, 1939) states that an acute trauma (without fracture) to a large joint region may instigate severe rarefaction in the long bones of the vicinity. In association with this rarefaction there are regressive changes in the overlying soft tissues. In particular the muscles are likely to become very atrophic. The post-traumatic rarefaction in question is uncommon. It has been noted often in the knee region than elsewhere. Because it is rare, and because the possibility of its recurrence is but little appreciated, the condition is usually misdiagnosed, at least when first encountered. Anatomically, the bone rarefaction is manifested in porosity of the compacta and meagreness of the trabeculae of the spongiosa. The rarefaction can be seen to be dependent upon hypervascularization, which is particularly prominent in the cortical bone. In the latter, the large resorption spaces are found filled with a loose fibro-fatty connective tissue bearing numerous engorged blood vessels. If the bone regions rarefied are such as normally have thin cortices, these regions are likely to yield easily under functional strain. Post-traumatic rarefaction is a stubborn condition. Indeed it is but slowly, if at all, that the affected

bones reacquire a completely normal Röntgenographic appearance. Recovery is favoured by active use of the affected part, in association with physiotherapeutic measures, such as diathermy and massage.

### PHYSICAL THERAPY.

#### Röntgen Therapy in Acute and Chronic Otitis Media.

J. P. BROWN, L. L. TITCHE AND W. E. LAWSON (*American Journal of Roentgenology*, August, 1939) point out that the treatment of middle ear infection with X rays is not new and that the rationale of this form of treatment is well founded. The breaking down of radio-sensitive lymphocytes relieves pressure within the cavity of the middle ear and so relieves pain; in addition, phagocytosis is promoted, and enzymes, antibodies and other unknown principles are thought to be liberated by the action of the rays. The technical factors used by these workers are 85 kilovolts (peak), five milliamperes of current, 16-inch target-skin distance, and one millimetre aluminium filter. In mild cases in infants they use doses of 50 to 60 r, and in young children and adults from 60 to 100 r. In acute catarrhal *otitis media* they found one treatment sufficient. In acute purulent otitis, from three to seven days should elapse between treatments, depending on the condition of the ear. The patients with chronic purulent otitis are treated at intervals of ten days. The most pronounced result is the effect in cases of acute catarrhal *otitis media*. It is striking to observe how quickly the pain is relieved, and in from two to three days the drum is normal. In acute purulent *otitis media* pain is relieved in a few hours; but the most useful effect is that the discharge, instead of continuing from four to six weeks following myringotomy or perforation, clears up in about a week. In chronic purulent cases it seems that a short series of X ray treatments will produce not only a dry ear and one that is free from pain, but one in which hearing is normal. No complication has occurred following this form of therapy.

#### The Radium Treatment of Angioma in Children.

R. PATERSON AND M. C. TOP (*American Journal of Roentgenology*, November, 1939) state that from the point of view of treatment it is convenient to divide angioma into: (a) capillary or the port wine stain; (b) compact or the rare solid angioma, sometimes mistaken for fibroma; (c) cavernous, a term used for a palpable tumour with the characteristic discolouration of the haemangioma. Three main methods of

treatment have been tried: surgical excision, cauterization and irradiation. If the lesion is on the face or occupies a large area on trunk or limbs, the cosmetic result of surgical excision is not perfect. Cauterization by carbon dioxide snow, electrolysis or diathermy produces unsightly white scars with the larger lesions. Irradiation, either with  $\gamma$  rays or filtered X rays, is the most suitable method for all but capillary angioma. Filtered Röntgen radiation produces the same effect as  $\gamma$  radiation; but in the treatment of young children it is difficult to keep them still, and the greater depth dose is a disadvantage if an epiphysis comes into the field of radiation because of the possible interference with the growth of bone. The authors describe the method of  $\gamma$  ray treatment used at the Manchester Radium Institute, where radium emanation sealed into silver seeds is applied on a mould built up of "Elastoplast" or "Elastoplast" felt. The patients are treated in the out-patient department, and the mother is told to remove and burn the entire mould at a fixed time, generally after three or six days. In certain situations, or if the tumour is very bulky, the implantation of gold radon seeds is a better method. The best time for treatment is during infancy, from three months to two years, though treatment is not contraindicated at any age. The dose employed with "Elastoplast" moulds was 1,500 r given over four days and repeated at a two months' interval. At the most three of these applications are usually enough. Of 150 patients treated between 1933 and 1936, 129 were considered to be well, the condition of thirteen was improved, and that of eight was not improved.

#### Lymphosarcoma.

ACCORDING to Ff. Roberts (*British Journal of Radiology*, December, 1939), lymphosarcoma presents features of great interest in its mode of spread, its histological characteristics and its behaviour to X radiation. Ewing's view of the mode of spread is that in the earlier stages the disease is confined to one region and spreads by continuous growth through the lymph channels, though in many advanced cases, at a later stage, metastases carried by the blood stream may form in distant organs, such as the lungs, brain and kidneys. The author, however, points out that when the disease spreads rapidly, dissemination may set in at an early stage and generalized metastases may outstrip regional development. Of the histological characteristics Ewing describes two types, based on the origin of the cells: (a) reticulum-cell sarcoma derived from the cells of the reticulum and sinuses, and (b) malignant lymphocytoma derived from the lymphocytes. The only agent capable of influencing its growth is radiation. It is in fact one of the most radio-sensitive tumours known.

Details are given of six cases in which deep X ray therapy has been used. Three patients are described from whom lymphosarcomatous masses in the neck had been removed surgically; the growths subsequently recurred, and then deep X ray therapy was used. All three patients are alive respectively seven and a half years, four years, and two and a half years after treatment was begun. In a fourth case definite diminution in masses in the parotid region and groin was noted after deep X ray therapy; but then early generalization of the disease occurred, followed by death some months later. In a fifth case rapid dissemination by the blood stream occurred almost from the outset, and the glands were involved in widely separated situations; but there was an astonishing response to X rays, a large mediastinal mass disappearing in four days. The sixth case was that of a female in whom X ray examination of the chest revealed a large mediastinal mass with a lobulated border. This was diagnosed as lymphosarcoma. Deep X ray therapy was given and the patient has since remained perfectly well. X ray examination now, after four and a half years, reveals a normal chest apart from slight prominence of the right hilar shadow. The author concludes that lymphosarcoma can be suppressed for a number of years and probably permanently cured by X ray treatment, provided that it is confined to one region of the body. Heavy dosage is usually essential.

#### Röntgen Therapy of Cystic Hygroma of the Neck in Children.

F. M. HODGES, L. O. SNEAD AND R. A. BERGER (*American Journal of Roentgenology*, October, 1939) point out that, although the treatment of cystic hygroma of the neck has in the past been almost entirely surgical, in a large percentage of cases complete surgical removal is impossible. These growths usually involve the side of the neck, but may extend upwards over the side of the face, downwards to the supraclavicular fossa and into the mediastinum, axilla and pleura. In seven cases the writers have obtained four excellent results, one moderately good result, and two failures with X ray therapy. They conclude that: (i) Cystic hygroma of the neck in infants is frequently a radio-sensitive growth. (ii) X ray therapy will cause a complete regression of the growth in a fairly large percentage of cases. In others the tumour may be shrunk to a point at which surgery is possible. (iii) Before other methods are attempted, this treatment, on account of better cosmetic results and lack of danger, should be tried in all cases except the very thin-walled, well-circumscribed cystic types, which can be easily excised. (iv) These growths should be treated when first noticed, since the early stages of development seem to be more radio-sensitive.

## British Medical Association News.

### MEETING OF THE FEDERAL COUNCIL.

A MEETING of the Federal Council of the British Medical Association was held at the Medical Society Hall, East Melbourne, on February 29 and March 1, 1940, SIR HENRY NEWLAND, the President, in the chair.

#### Representatives.

The following representatives of the Branches were present:

**New South Wales:** Dr. George Bell, O.B.E., and Dr. W. F. Simmons.

**Queensland:** Dr. D. Gifford Croll, C.B.E., and Dr. T. A. Price.

**South Australia:** Sir Henry Newland, C.B.E., D.S.O.

**Tasmania:** Dr. W. E. L. H. Crowther, D.S.O.

**Victoria:** Dr. F. L. Davies and Dr. H. C. Colville.

**Western Australia:** Dr. F. W. Carter and Dr. L. E. Le Souef.

Sir Henry Newland acted as proxy for Dr. A. F. Stokes, and Dr. W. E. L. H. Crowther as proxy for Dr. S. Gibson.

#### Minutes.

The minutes of the previous meeting of the Federal Council of September 6 and 7, 1939, which had been circulated among members, were taken as read and signed as correct.

#### Appointment of Office Bearers.

Only one nomination for the office of President had been received, that of Sir Henry Newland, and he was therefore declared elected. Sir Henry Newland thanked the members for his reelection, and said that it had been his intention not to seek office again, but that on account of the war he thought it was his duty to continue in office if members desired him to do so.

Only one nomination for the office of Vice-President had been received, that of Dr. George Bell. Dr. Bell was declared elected. Dr. Bell was also reelected as Honorary Treasurer of the Federal Council.

#### Finance.

The financial statement as at December 31, 1939, was presented. The statement included the Federal Council account and the Australasian Medical Congress (British Medical Association) fund account. The statement was received. The Federal national health insurance emergency account was also presented. The statement, which covered the period from July 6, 1938, to December 31, 1939, was received. The General Secretary stated that interest to the sum of £25 5s. on debentures held by the Federal Council in the British Medical Association House, Sydney, had been paid to the congress fund.

The General Secretary referred to the financial position of the Federal Council and to correspondence which had taken place between himself and the Parent Body in London. At the previous meeting of the Federal Council a proposal had been received from the Council of the Parent Body, according to which receipt of *The British Medical Journal* by the members of the Association in Australia would not be obligatory. Instead of sending to England the sum of 25s. 6d. in respect of each member, the Branches would, if the proposal was adopted, send a *per capita* payment of 5s. *THE MEDICAL JOURNAL OF AUSTRALIA* would then be regarded as the official organ of the British Medical Association in Australia, and it would be asked to undertake the publication of such notices as might be sent to it from the Parent Council. The Parent Body would undertake to send to each member a copy of the annual report of Council and of the financial statement. Any member in Australia who wished to receive *The British Medical Journal* would be able to do

so on the payment to the Home Association of £1 11s. 6d. English currency. The General Secretary said that he had written to the Parent Council in the terms of the decision of the Federal Council at its previous meeting, that members in Australia did not wish to be without *The British Medical Journal*, and that although for financial reasons it was thought that something should be done, there was no wish to do anything that might weaken the tie between Australia and the Mother Country. He had therefore asked the Parent Council to reconsider its previous decision and to reduce the *per capita* payment from £1 5s. 6d. to £1 *per annum*. A reply had been received in the first place that the matter would be brought before the Council of the Parent Body, and subsequently that it had been considered by a meeting of the Executive Committee, which, owing to war conditions, was carrying out much of the work of the Council. The Executive Committee had replied that it could not agree to the proposed reduction from £1 5s. 6d. to £1, and added that in the circumstances the whole discussion should be postponed until the end of the war.

The General Secretary pointed out that the Federal Council would have to take some steps to secure funds, that it might carry on its activities. He gave detailed reasons for his statement that no sum less than a *per capita* payment of 4s. per member of the Branches would be sufficient.

The question of the *per capita* payment to the Federal Council was considered in conjunction with the proposal that some alteration might be made in the Branch subscriptions of members going overseas on active service. The General Secretary reported that he had received a letter from the Western Australian Branch, in which it was stated that the subscription of army medical officers should be considered. The Queensland Branch had written stating that it had waived the subscription of its members who had gone on active service abroad, and it had asked that the supply of journals to these members should be stopped. The Victorian Branch thought that the taking of *THE MEDICAL JOURNAL OF AUSTRALIA* by members on active service overseas should be optional and that a further approach should be made to the Parent Body regarding *The British Medical Journal* and the *per capita* payment of £1 5s. 6d. The South Australian Branch thought that some reduction in subscription should be effected. The New South Wales Branch Council had decided that members who went on active service overseas should be treated in the matter of subscription as though they were full-time public medical officers, so that their subscription would be reduced by one guinea *per annum*.

On the matter of the *per capita* payment to the Federal Council, a motion by Dr. F. L. Davies to the effect that payment on behalf of members on active service should be waived was lost; subsequently a motion by Dr. Davies that the *per capita* payment for the ensuing year should be 5s. was carried.

The Secretary read a letter which he had received from the Chairman of the Australasian Medical Publishing Company, Limited. The Chairman wrote because he understood that consideration would be given by the Federal Council to a request by several Branches that *THE MEDICAL JOURNAL OF AUSTRALIA* should be discontinued to members absent on active service. The Chairman quoted an article from the Articles of Association of the New South Wales Branch, in which it was stated that each year's subscription to the Branch should entitle the member to receive *THE MEDICAL JOURNAL OF AUSTRALIA*. He presumed that the articles or by-laws of other Branches contained a similar provision. He then pointed out that during the war of 1914-1918 no steps were taken to discontinue the sending of journals to members on active service, and in New South Wales there was a slight increase in membership during every year of that war. *THE MEDICAL JOURNAL OF AUSTRALIA*, he thought, would necessarily be considered a "valuable adjunct" to any member on active service and would keep him in touch with medical matters in his home country. He added that the whole of the advertising revenue of the journal depended upon the circulation of *THE MEDICAL JOURNAL OF AUSTRALIA* to all members of the

British Medical Association in Australia. Any interference with this position would be prejudicial to the interests of the journal. As it was, he anticipated that the war would inevitably affect the volume of advertising. Moreover, the cost of printing-paper had considerably increased. The additional cost on present orders would run into several hundreds of pounds, and this price would be further increased if the Commonwealth Price Commissioner granted to the paper mill any further increases on the two that he had already allowed. It was the intention of the Australasian Medical Publishing Company, Limited, to carry the increased cost of the journal. At the same time, if costs continued to increase the directors would have to consider approaching the Branches for an increase in the *per capita* payment.

Dr. F. L. Davies said that there was nothing in the rules of the Victorian Branch to say that the members had to take the journal. He moved that the Australasian Medical Publishing Company, Limited, be asked to make the taking of the journal by members on active service optional. The motion was lost. A motion that the Parent Body be approached to make the taking of *The British Medical Journal* optional by members on active service was also lost. Dr. T. A. Price said that it was obvious that the payments to the Federal Council, to the Australasian Medical Publishing Company, Limited, and to the Parent Body would have to remain unchanged, and he moved that each Branch should make what concessions it could to members on active service. This motion was carried. The Council also agreed to a motion by Dr. D. G. Croll to the effect that the Australasian Medical Publishing Company, Limited, be asked if it could make any concession to members on active service.

#### The All-India Institute of Hygiene and Public Health.

A letter was received from the All-India Institute of Hygiene and Public Health asking the Federal Council for any information at its disposal on the subject of medical economics (health or social insurance). It was resolved that all available information should be forwarded.

#### The Inspection of Military Camps.

A letter was read from the Director-General of Medical Services, stating that it was the desire of the Commonwealth Government that a medical practitioner in each State should be nominated to report on the hygiene of military camps. The Director-General of Medical Services had expressed the hope that the Federal Council would cooperate in this matter. It was noted that during the war of 1914-1918 a somewhat similar arrangement had been made. Dr. L. E. Le Souef spoke in favour of the proposal and Sir Henry Newland said that any inspection of military camps by civilian medical officers should be in the nature of a consultation with the Deputy Director of Medical Services of the military district in which the camp was situated. After discussion it was resolved that the following medical practitioners should be asked whether they would accept nomination for this duty: *Victoria*: Dr. John Dale; *New South Wales*: Dr. E. Sydney Morris; *Queensland*: Dr. A. H. Marks; *Western Australia*: Dr. L. A. Hayward; *Tasmania*: Dr. B. M. Carruthers; *South Australia*: Dr. A. R. Southwood.

#### Australasian Medical Congress (British Medical Association).

The General Secretary reported that he had communicated to Dr. D. D. Paton, president-elect of the sixth session of the Australasian Medical Congress (British Medical Association), the decision of the Federal Council at its last meeting that the date of the sixth session should be postponed, and hoping that the Western Australian Branch might be able to arrange for the session to be held at a later date. He read Dr. Paton's reply.

#### Medical Officers' Relief Fund (Federal).

Dr. George Bell, on behalf of Dr. J. Adam Dick, Dr. G. C. Willcocks and himself, the trustees of the Medical Officers' Relief Fund (Federal), presented an interim

report for the half-year ended December 31, 1939. He explained that this fund had been created by voluntary subscription from members of the medical profession in Australia for the relief of medical officers disabled during the war of 1914-1918. The fund could also be used for the relief of widows of disabled medical practitioners and for the education of their children. The total assets at December 31, 1939, consisted of more than £10,000. Twelve loans, amounting in all to upwards of £3,383, were in existence on December 31, 1939. Of the twelve loans, seven were covered by promissory notes, and in six instances the notes were being regularly met each half-year. Of the remaining five loans, the interest on three was being paid regularly, and in one instance the principal was being gradually repaid; great difficulty was being experienced in obtaining repayments for the other.

In reply to an inquiry from the Western Australian Branch, it was stated that beneficiaries of the fund were confined to medical officers who had participated in the war of 1914-1918 and their dependants. For the present war a new fund would have to be created if it was thought necessary to have one.

#### National Health and Medical Research Council.

The General Secretary reported that he had notified the Director-General of Health, Commonwealth Department of Health, that Dr. J. Newman Morris had been appointed as representative of the Federal Council on the National Health and Medical Research Council for three years as from January 1, 1940.

The report of the sixth session of the National Health and Medical Research Council, held at Adelaide on May 24 and 25, 1939, and that of the seventh session, held at Canberra on November 1 and 2, 1939, were received.

#### Australian-New Zealand Cancer Conference.

The report of the tenth Australian-New Zealand Cancer Conference, held at Wellington, New Zealand, on February 15 to 17, 1939, was laid on the table.

#### Organization of the British Medical Association in Australia.

Further reference was made to the organization of the British Medical Association in Australia, which had been discussed at the last meeting of the Federal Council. At that meeting the incorporation of the several Branches was discussed, and in view of the declaration of war no further action was taken. It was resolved that owing to the war further consideration of the matter should be deferred.

#### British Medical Association Scholarships and Grants.

The General Secretary reported that no applications had been received for British Medical Association scholarships or grants.

#### Pensions for Sufferers from Early Tuberculosis.

At several previous meetings of the Federal Council consideration had been given to the provision of pensions for sufferers from early tuberculosis. At the meeting of the Federal Council in September, 1939, a resolution was adopted laying emphasis on the importance of the economic factor in the control of tuberculosis, and urging the introduction of a system of family endowment by the Government, which would enable early curative treatment to be instituted and the families of tuberculous patients to be adequately provided for. The General Secretary reported that he had communicated the views of the Federal Council to the Federal Minister for Health. He had received a reply that the matter had received consideration, that the value of the suggestions was recognized, but that the Government was unable to add to its present financial obligations. The letter was received.

#### Alien Medical Practitioners.

The General Secretary reported that he had had correspondence with the Branches regarding the registration of

alien medical practitioners and their admission to membership of the British Medical Association. The South Australian Branch was concerned with applications from practitioners who had been registered but were not naturalized. It was admitted that the South Australian *Medical Act* required amendment, but it was thought that the Government was half-hearted about it. The Victorian act had been amended since a recent appeal had been heard in the Supreme Court, and the Queensland Branch wished to be informed of the position. The New South Wales Branch held that no enemy alien practitioner should be registered during the war or for one year after its termination, but that any alien practitioner who was registered could be elected if he was eligible for membership. It was resolved:

1. That in general the principle be adopted that medical practitioners registered in any State should be admitted to membership of the Association irrespective of nationality.
2. That foreign applicants for membership should if possible be nominated by Australian members.

It was also resolved that the views of the Parent Association should be obtained on the rules of the Association regarding the transfer of members from one Branch to another as they affected alien practitioners. It was pointed out that an alien practitioner might become registered in one State and join the Branch of the British Medical Association in that State. If he moved to another State in the Commonwealth he would, according to the rules of the Association, be automatically transferred to membership of the Branch in that State, although he might not be eligible for registration in the State.

#### War Emergency Organization.

##### *Duties of a Deputy Director of Medical Services.*

Attention was drawn to the anomalous position of some of the deputy directors of medical services. Some of these officers were supposed to be engaged in half-time duty. They held the rank of lieutenant-colonel or colonel, their duties were onerous and they received less pay than that of a medical superintendent of a country hospital. It was resolved that the matter should be brought to the notice of the Director-General of Medical Services.

##### *Army Medical Officers in the Australian Imperial Force and in the Militia.*

Attention was drawn to the conditions of service of medical officers in Queensland who were called upon to give service as provisional captains. Some of these men in the past had received the pay of a lieutenant, and it was held that this was inadequate in view of the work which had to be done. It was thought in Queensland that some discrimination was exercised in regard to the conditions in the several States. The matter had been brought to the notice of the Director-General of Medical Services, who had replied that the pay of a provisional captain would be the same as that of a captain, and that no distinction was made in the several States.

A letter was received from the Western Australian Branch, drawing attention to the position of government medical officers who were transferred from their own department to serve in the Defence Department, and in the latter position received the pay of an army captain. It was held that they were still departmental medical officers and that when they were serving in the Defence Department they should receive the same pay as they received in their own departments. The Victorian Branch thought that a subcommittee should be appointed to watch the interests of medical practitioners who were called up for service. One of the matters which demanded attention, it held, was the payment of the *locum tenens* allowance which had previously been paid to medical practitioners serving in militia camps. It was pointed out that when a medical practitioner left his practice for, say, three months, he was involved in heavy expenditure in the provision of a *locum tenens* for his practice. Since the *locum tenens* allowance had been abolished many men

had suffered considerable hardship. Sir Henry Newland reported that he had written to the Prime Minister about the *locum tenens* allowance and had received a reply to the effect that the matter was under review. It was resolved, on the motion of Dr. F. W. Carter, seconded by Dr. George Bell, that further action should be taken if the reply officially received from the Government was not satisfactory. It was also resolved, on the motion of Dr. W. F. Simmons, that representations should be made to the Commonwealth and State Governments that loss of pay by full-time salaried officers of the Government should be made up to them by the Government concerned when they were called to serve in the militia.

It was resolved, on the motion of Dr. George Bell, that a subcommittee consisting of Dr. F. L. Davies and Dr. H. C. Colville, with powers of cooption, should be appointed to inquire into and to deal with matters relating to the conditions of service of officers in the army medical services.

On the motion of Dr. L. E. Le Souef, seconded by Dr. George Bell, it was resolved that the subcommittee consisting of Dr. F. L. Davies and Dr. H. C. Colville should also investigate the possibility of obtaining a professional allowance for Australian Army Medical Corps officers.

#### *The Enlistment of Medical Officers.*

The General Secretary reported that a letter had been sent in October, 1939, to the Prime Minister, signed by the Presidents of the Federal Council and the Royal Australasian College of Physicians and the Royal Australasian College of Surgeons, drawing attention to the unsatisfactory enlistment of medical officers for military service. The Prime Minister had been informed that enlistment was not likely to be satisfactory until some information was given as to the number of men who might be required, when their services would be needed and what their duties would be likely to be. No reply had been received from the Prime Minister. As conditions at the present time were not the same as they had been in October, it was resolved that no further steps need be taken.

#### *Good Wishes of the Association to Members of Medical Units Proceeding Overseas.*

The President reported that he had written to Colonel R. Burston, Deputy Director of Medical Services of the Second Australian Imperial Force, conveying the good wishes of the Federal Council and of the medical profession in Australia to the medical units proceeding overseas. Colonel Burston had sent an appreciative reply.

#### *Friendly Society Contract Practice.*

At the previous meeting of the Federal Council consideration had been given to the adoption of a model common form of agreement for friendly society contract practice throughout the Commonwealth. It was decided at that meeting that the matter should be referred to the Contract Practice Subcommittee, with a view to having an acceptable common form of agreement drafted, and it was also agreed that the Branches should be asked to take no action until they had received further notification from the Federal Council. The General Secretary presented the report of the Contract Practice Subcommittee as a draft model common form of agreement. The several clauses of this agreement were discussed *seriatim*. Several amendments were made, and the agreement as amended was adopted and it was resolved that it should be forwarded to the Branches.

#### *A General Medical Service.*

Consideration was given to the resolution of the Federal National Health Insurance Committee that the policy of the British Medical Association in Australia should be the provision of a complete medical service for the nation. The committee also recommended that the pamphlet "Planning for Health" should be considered by the Publicity Committee of the Federal Council and published if thought fit. The pamphlet was submitted to the Federal Council, and it was resolved that Dr. George Bell

and Dr. W. F. Simmons, with powers of cooption, should act as a subcommittee to report on the pamphlet to the next meeting of the Federal Council.

#### Subcommittees of the Federal Council.

Dr. F. W. Carter proposed a motion to the effect that the Federal Council viewed with disfavour the appointment of salaried officers to subcommittees of the Council. He thought that such action was not in the best interests of the members of the Branches. He admitted that the views of salaried officers were likely to be most helpful. He thought that use should be made of them; but he held that these officers should be coopted to committees and not made members of them. The motion was carried.

#### The Contract Practice Subcommittee of the Federal Council.

It was noted that the appointment of the Contract Practice Subcommittee of the Federal Council terminated with this meeting of the Council. If the Federal Council wished to have a contract practice subcommittee it would be necessary, the General Secretary stated, for a new subcommittee to be appointed. It was resolved, on the motion of Dr. George Bell, that this subcommittee should be reconstituted and that the Branches should be asked each to submit one name for nomination to this subcommittee.

#### Matters Deferred.

Owing to the war, the consideration of the Federal Emergency (Compensation) Fund, of principles of medical ethics and of the terms and conditions of appointment to the public medical services, was deferred.

#### List of Drug Synonyms and Trade Names.

A communication was received from the Drugs Subcommittee of the Australian Association of Scientific Workers for permission to insert on the title page of a list of drug synonyms and trade names the words: "Approved and distributed by the Federal Council of the British Medical Association." This permission was sought because the Australian Association of Scientific Workers proposed to distribute copies of the list *gratis* to medical practitioners. It was resolved that the Federal Council was willing to ask Branches to distribute the list among members.

#### Date and Place of Next Meeting.

Determination of the date and place of the next meeting was left in the hands of the President.

#### Votes of Thanks.

A vote of thanks was accorded to the Council of the Victorian Branch of the British Medical Association for having provided accommodation for the meeting and for its hospitality.

A vote of thanks was also accorded to Sir Henry Newland for having presided.

#### SCIENTIFIC.

A MEETING of the Western Australian Branch of the British Medical Association was held on September 10, 1929, at the Government Hospital, Kalgoorlie, Dr. N. M. CUTHBERT, the President, in the chair.

#### Epigastric Pain of Obscure Origin.

DR. H. J. DAVIS showed a European boy, aged thirteen years, who had suffered from epigastric pain for some years. A radiographic examination had revealed some probable enlargement of the liver. There was no history of dysentery. The boy's blood had been examined frequently, but with negative results, and neither the Kline

test nor the Casoni test elicited a reaction. The only item of importance in the family history was the father's death from tuberculosis. Dr. Davis admitted that he was at a loss for a diagnosis, but said that he was sure that the pain was very real to the boy.

DR. R. H. CRISP said that amoebic hepatitis was a possibility, even in the absence of a history of dysentery. He considered that the boy was probably a candidate for cirrhosis later in life.

DR. S. E. CRAIG discussed the possibility of diaphragmatic hernia, and said that the pain usually occurred when the patient was recumbent.

DR. M. KELLY mentioned the possibility of muscular rheumatism.

DR. N. M. CUTHBERT suggested a search for septic foci.

DR. H. STEWART remarked that a number of Slavs suffered from vague abdominal pain. He thought that there was some likelihood that a dysfunction of the mental or autonomic nervous system was to blame.

#### Deformity of a Finger.

DR. P. W. SHANAHAN showed a patient who, as a result of septic tenosynovitis, had been left with a deformity of the left ring finger; flexion limitation of movement, pain, tenderness and anaesthesia were present. Dr. Shanahan asked whether excision of the scar and replacement by a pedicle graft would prove successful.

DR. H. Stewart agreed that this form of treatment would be of value. He pointed out that the digital nerve was probably caught in the scar and should be looked for. He advised Dr. Shanahan that in making the graft it was best to leave the skin a little redundant.

#### A Case for Diagnosis.

DR. A. B. WEBSTER showed a man, aged thirty-four years, who had suffered for about twelve months from pain in the right lower quadrant of the abdomen. During the preceding three months the patient had been aware of a tender lump about three inches medial to the right anterior superior iliac spine. This lump appeared to have an impulse when he coughed, and was believed to be a hernia in an unusual situation. Dr. Webster remarked that Rose and Carless had referred to the occasional presence of congenital prolongations of the peritoneum at the outer border of the rectus sheath, although the upper portion of the abdomen was said to be a more common site than the lower portion.

There was no unanimity of opinion with regard to the diagnosis.

#### Hydronephrosis and Aberrant Renal Artery.

DR. A. DALY SMITH showed a series of X ray films from a case of hydronephrosis associated with an aberrant renal artery. A plastic operation had resulted in a considerable degree of improvement in kidney function; this had been proved by radiological examination after the introduction of "Per-Abrodil". A corresponding improvement had occurred in the patient's clinical condition.

DR. H. Stewart agreed with Dr. Daly Smith that although a plastic operation on the pelvis of the kidney was frequently practised in the United States of America, the general feeling in Australia was that it was unnecessary. Although a large part of the kidney might turn blue when the aberrant renal artery was cut, drainage through the cortex with a tube was unnecessary. Dr. Stewart considered that the pain in the case under discussion was due to a true Deitl's crisis; there was not enough blood flowing through the kidney for it to excrete urine. The way in which the kidney could recover its function was amazing, and Dr. Stewart expected a recovery in the case they were considering. However, if the urine was infected, such an improvement was not to be expected.

No decision was reached as to whether the artery was the actual cause of the hydronephrosis or whether this was caused by some neuro-muscular abnormality.

#### Shoveller's Fracture.

Dr. Daly Smith also showed X ray films from a case of shoveller's fracture in which conservative treatment had been carried out.

Dr. Dawkins congratulated Dr. Daly Smith on his conservatism. He said that avulsion fractures, as a general rule, did not unite well; but it was advisable not to tell the patient this.

Dr. R. D. McKELLAR HALL agreed with this statement. He said, however, that usually by the time he saw the patients they knew all about their injury. He believed that the removal of the fragment distributed the area of muscular pull on the fragment and diminished the pain. Removal of the fragment was a procedure that was probably practised only in Western Australia.

Dr. P. W. Shanahan suggested rest in bed as an alternative treatment.

Dr. McKellar Hall disagreed with this suggestion.

Dr. H. Stewart said that he had seen a number of similar cases. The patients were chiefly sustenance workers, working in clay areas. Rest in bed for six months was not successful in some cases, owing to psychological factors. The best treatment was removal of the fragment as early as possible. The effects of the injury should be minimized to the patient, and he should be kept from legal proceedings for compensation.

Dr. McKellar Hall said that he had seen one such fracture made to unite by means of a bone graft; but he did not recommend that method of treatment.

#### Spina Bifida Occulta Cervicalis.

Dr. Daly Smith showed an X ray film from a case of *spina bifida occulta cervicalis*. The condition had been revealed during the investigation of an injury which the patient had sustained when pressing upwards against a heavy weight with his head.

Dr. McKellar Hall said that he had not seen a case of *spina bifida occulta* above the level of the first thoracic segment; but it was common in the lumbo-sacral region. It was taught that these structural weaknesses might predispose to strain, and might in their turn be accentuated by strain. It was not right, however, to blame strain for all symptoms, especially in the neck. The condition should be borne in mind, but its importance should not be exaggerated.

Dr. DONALD SMITH drew an analogy between *spina bifida occulta* and the condition of a wire fence when a post was missing from it; the interspinous ligaments corresponded to the wire.

Dr. H. Stewart pointed out the fact that those patients who had a laminectomy performed for other causes did not appear to suffer any great disability from it.

#### Compound Fracture of the Pelvis.

Dr. B. GILLETT showed X ray films from a case of compound fracture of the pelvis. The patient was a female. The bladder had been ruptured in its anterior wall, extraperitoneally, and also into the peritoneal cavity. The bladder had been opened and sutured, and a drainage tube had been left in. At operation the peritoneal cavity had been found to be full of urine and obviously infected. It had been drained by suction and closed, and the patient had made a good recovery. Dr. Gillett said that the interest of the case lay in the fact that so grossly infected a peritoneum had been able to recover without outside drainage.

#### Pansinusitis.

Dr. Daly Smith showed a patient suffering from pansinusitis and also from cellulitis of the right orbit. He said that he had seen the patient in consultation with Dr. Noel Cuthbert.

Dr. Cuthbert discussed the differential diagnosis from both the clinical and the radiological points of view. Dr. Cuthbert also discussed the improvement that had occurred as a result of treatment by means of antral lavage and the administration of sulphanilamide.

#### Extensive Burns.

Dr. H. J. Davis showed an aboriginal child suffering from extensive burns. The child had been seen by Dr. Davis seven days after the injury had been sustained. Tannic acid preparations could not be used, owing to the presence of sepsis.

Dr. Stewart suggested a saline bath for such patients, right from the beginning. He thought that possibly a tannic acid preparation could have been used if an antiseptic had been added, such as the three dyes. Dr. Stewart also suggested that the creases should be kept out by extension of the limbs. He stressed the value of skin grafting when the granulations were healthy.

#### The Diagnosis and Treatment of Injuries to the Back.

Dr. McKellar Hall demonstrated the procedure necessary for the thorough examination of a patient suffering from an injury to the back. He stressed the facts that all back injuries were similar to those occurring elsewhere in the body, that the type of tissue present was similar to that of the limbs, but that the back was to be regarded as a whole series of joints. Thorough examination of such a patient should take from three-quarters of an hour to one hour. First, it was most important to take a careful history and to find out exactly what had happened to the patient at the time of injury, where his original pain was situated, where it was at the time of examination and what changes in type or place occurred subsequently. Backache could be caused by many conditions which had nothing to do with orthopaedics. It was necessary to consider the effect of any acute illness, such as influenza or acute tonsillitis, of conditions of the genito-urinary system, of prostatitis, and in females of gynaecological conditions; neurological conditions, tumours of the *cauda equina*, posture, toxic myositis from a chronic septic condition in antra, tonsils and teeth, and lastly hysteria might also be occasional causes of backache.

In the acute type of backache, rupture or tearing of muscle fibres or ligaments was suggested, and a careful history of the mode of onset had to be taken. True malingering was very rare; exaggeration of symptoms was very common especially in cases of long standing, because the patient was often very worried as to whether he would be able to work again. It was necessary to reassure him, and get his confidence. To dig up his past history of periods during which he received compensation did not seem to help much, since some men had a series of accidents and were frequently in receipt of compensation, not because they preferred it, but because they had been unfortunate. Indirect observation was useful. In any scheme of examination, the medical attendant should see that the same series of movements was given to the patient in different postures. If his pain was genuine, the patient would have the same reactions to similar movements in different postures, and it would be difficult for him to be consistent if he was malingering.

Dr. Hall then demonstrated the manoeuvres necessary to elucidate subjective pain as an aid to the diagnosis of back disorders.

Dr. DAWKINS dealt with acute back injuries. He said that these were usually associated with damage to muscle. There was no mystery about the back, if the spine was considered as a system of joints. When the muscles were strained there was a point of tenderness, but usually not over the muscle belly. There were three points of interest about this spot: (i) it was usually at the origin or insertion of the muscles or at the spot where muscle fused into tendon; (ii) it caused pain when the muscle contracted against resistance; (iii) it caused pain when passively stretched. When intervertebral joints were strained the strain was usually associated with muscle tears; it was therefore as well not to regard the muscle tear as a separate entity. Myositis, on the other hand, caused pain over the muscle belly. Lumbago caused generalized tenderness over the muscles of the back.

Dr. Dawkins stressed the need for more careful diagnosis. He said that tenderness over the spinous

process of a vertebra was usually not important. He suggested that from the general practitioner's point of view it was well to ignore the *nucleus pulposus*, as this was uncommon, and the use of lipiodol in diagnosis was not without risk.

Dr. Dawkins went on to say that acute sacro-iliac strain was a very real thing, and might be cleared up quickly. In the treatment of the acutely strained back it was best for the patient to have a short period of complete rest, to enable the ruptured fibres to heal. Afterwards use was important. Early active movement was advised, even if the back was still a little painful. Massage played an important part. It had to be adequate, and required to be applied by a skilled person and associated with graduated exercises. Myositis and lumbago should be treated by rest and the application of heat; massage should be employed later, even if pain was present. Massage and the application of heat frequently gave relief. Sometimes injections of various substances into the painful nodules were of value.

Dr. Dawkins then said that the majority of patients with injured backs should be well in six weeks, if properly treated. If they were not better then, either the diagnosis or the treatment had been faulty. In conclusion Dr. Dawkins stressed the value of the three following points: (i) cheerfulness and optimism on the part of the medical attendant; (ii) the easy detection of malingerers; (iii) the usual need for a minimum of rest and a maximum of exercise.

Dr. Donald Smith stressed the need for good X ray films. He said that stereoscopic films were particularly desirable, and any other films that were taken should be carefully centralized. It was necessary to have plenty of films. Dr. Smith demonstrated and described suitable postures for the patient, so that the films might yield the best information. He also remarked that an occasional "catch" in the radiographic diagnosis was the existence of separate ossification centres of the spinous processes.

#### Industrial Eye Injuries.

Dr. D. R. GAWLER read a paper entitled "Industrial Eye Injuries" (see page 401).

(To be continued.)

#### Correspondence.

##### BIOLOGY AND MEDICINE.

SIR: Dr. C. Craig's letter in the journal of February 17 refers to Morley Roberts's theory of evolution. Any advancement in our knowledge, and especially of our interpretation and understanding of our knowledge of evolution and the forces behind evolution, is of the utmost importance for the solving of many problems which confront the medical practitioner, particularly in the understanding of congenital abnormalities, with their superimposed functional difficulties, in the scourge of malignant disease and in the possibly greater scourge of neuroses and psychoses.

Evolution is presumably the continual adaptation in organisms between some form of emergent differentiating urge and the external environment. It is easy to imagine that problems of malignancy are related to problems of evolution, but difficult to imagine evolution as the result of potential malignancy. Surely it is the other way about: that malignancy represents at cell levels the same failure of adaptation in the evolutionary forces that abnormalities do at tissue levels and the psychoneuroses at psychic levels. Fortunately we can detect some of the mechanisms behind evolution. The details of the evolution of the tail structures into the structures of the pelvic floor in the human body have been worked out in some detail and mechanisms of condensation and displacement of function are clearly seen. The analogy with the mechanisms of condensation and displacement, so familiar

in psychological work, comes to mind, and I remember an article some years ago in THE MEDICAL JOURNAL OF AUSTRALIA pointing out certain analogies between the behaviour of malignancies and mechanisms operative in the psychoneuroses.

While believing that these analogies are superficial and insufficiently elaborated as yet, I am convinced that the underlying mechanisms behind morbid cytology, morbid histology and psychopathology are similar to the mechanisms which would occur in a failure of evolutionary forces to adapt themselves to the particular environment of the moment, and that studies in all these departments of research cannot fail to be mutually illuminating if their interdependence is kept in mind.

Yours, etc.,

335, St. Kilda Street,

Brighton,

February 24, 1940.

H. SELBY LINK.

#### OVARIAN RUPTURE CAUSING INTRAPERITONEAL HÆMORRHAGE.

SIR: I wish to reply to Dr. Stewart McKay's letter in THE MEDICAL JOURNAL OF AUSTRALIA of November 18, 1939.

First, I must apologize for the delay in answering, owing to circumstances beyond my control, chiefly postal irregularities due to the war.

In my contribution on the above subject (THE MEDICAL JOURNAL OF AUSTRALIA, October 21, 1939), I dealt only with haemorrhage into the Graafian follicle and *corpus luteum* or their derivatives as a cause of intraperitoneal haemorrhage. I specifically excluded other ovarian conditions, as, for instance, endometriosis, and for this reason I made no reference to the study by J. A. Sampson on "Benign and Malignant Endometrial Implants in the Peritoneal Cavity and their Relation to Certain Ovarian Tumours" (*Surgery, Gynecology and Obstetrics*, Volume XXXVIII, March, 1924, page 287).

Yours, etc.,

THOMAS F. ROSE, F.R.C.S. (Eng. and Edin.), M.R.C.O.G.

Morden Hill,  
London, S.E.13,  
February 24, 1940.

#### THE SANATORIUM—QUO VADIS?

SIR: In what may be termed the English sanatorium centenary year, Dr. Alan Penington's article is opportune. It is well that we should take stock now of the position of the sanatorium in the anti-tuberculosis campaign and endeavour to assign to it a function in the future. It is to be hoped that his article will excite debate and even controversy, as the problem is a live one.

Firstly, some minor historical inaccuracies may be mentioned. It was in 1882 (not 1891) that Forlanini first laid down the basis of artificial pneumothorax therapy and practised it successfully. In 1898 the surgeon J. B. Murphy, in Chicago (not Ireland), wrote, apparently in ignorance of Forlanini's work, on the same subject.

Dr. Penington's desire is that the sanatorium (or chest hospital) should have an extremely broad function, ranging from diagnosis to rehabilitation of the patient. I think, however, that this concept is too wide in its scope ever to become a practical proposition, at least in Australia. For us I submit the future plan of the patient's progress, from an institutional standpoint, should be:

G.P.  $\Rightarrow$  Chest Clinic  $\rightarrow$  Chest Hospital  $\Rightarrow$   
Sanatorium  $\Rightarrow$  Settlement.

There are, of course, various other linkages in this chain, but we may accept a simple basic formula. This makes the chest hospital, which may be part of a larger hospital or self-contained, an independent unit in the tuberculosis scheme; but preferably the clinic would be attached to the hospital. All chest conditions should be dealt with

at this hospital (compare Brompton, Victoria Park *et cetera*) and it should be close to if not within the city bounds. This fundamental point is now being recognized throughout the world, and the reasons are obvious. Accessibility to the patient's friends, and, more important, to the best medical and surgical advice that the city can offer, take precedence over climatic amenities while the patient is undergoing observation or perhaps specialized treatment. The sanatoria will still remain, preferably in selected climates; minor procedures can be carried out there, such as perhaps thoracoscopy and phrenic nerve crush (artificial pneumothorax is taken for granted—probably about 50% of the patients will, or should, be having this); but they should rather be regarded as places for selected patients who are in general afebrile and ambulant. Thus administrative and general running costs should be low, as opposed to the hospital. I do not think Dr. Penington's argument is sound, that transferring patients "from one hospital to another" will increase costs. Each institution will deal with patients according to its particular function.

With most of what Dr. Penington writes I am in complete agreement, and I realize there is a great deal to be said for the "sanatorium-hospital", of which I saw many excellent examples abroad. But I feel strongly that the new unit which every State in Australia should have in its tuberculosis scheme is the chest hospital, rather than a remodelled sanatorium. The accepted world standard requirement is two beds for every tuberculosis death *per annum*. The bed shortage for tuberculosis in every State is disgraceful; the urgent need is obvious. Let the sanatoria remain in the country; modernize them by all means—most of them need it badly. But let us concentrate on establishing in every capital city—Adelaide has already shown the way—a first-class hospital for the diagnosis and treatment, both medical and surgical, of diseases of the respiratory tract.

Yours, etc.,

137, Macquarie Street,  
Sydney,  
March 11, 1940.

COTTER HARVEY.

#### SPRING CATARRH.

SIR: The case reported by me in the journal on February 27 has been under continuous treatment with "Prontosil soluble" drops, 2.5%, twice daily since the beginning of January. An attempt was made to partially substitute "Proseptasine" ointment for the "Prontosil soluble", but it was not satisfactory.

The improvement has been steady, both subjectively and to a remarkable extent objectively; but whether it will end in complete cure remains to be seen. At all events, to date it has been far more satisfactory than any other method of treatment I know of.

I am writing to Egypt to suggest its trial in the Middle East, where spring catarrh is frequent and severe.

Yours, etc.,

103-105, Collins Street,  
Melbourne,  
March 11, 1940.

JAMES W. BARRETT.

#### HOSPITAL INSURANCE.

SIR: The American Hospital Association has attained great dimensions. It arose from the desire of independent-minded people to insure themselves against the costs of hospital and to a limited extent part medical attendance, which everyone and every family must face sooner or later. There are a number of plans, differing in some details, but all providing some form of hospital insurance. The subscriptions vary from 2s. to 3s. per month for individuals, and 4s. to 8s. per month for families.

Characteristically American, it is free from government control and government aid. It does not seek philanthropic help, but is a definite insurance scheme for those who

want it. The American people apparently rejected national insurance in favour of this system. It commenced in January, 1933, with 2,000 enrolments, and on January 1, 1940, it was estimated that the enrolments numbered 4,500,000. The arrangements made with the different hospitals vary greatly; but two features are constant—the patient must have free choice of doctor and of hospital.

Like the Victorian Bush Nursing system, it keeps clear of government management; but, unlike our system, it also rejects philanthropic assistance; but, like our system, it keeps aloof generally from considering the relations between doctor and patient.

For the above information I am indebted to Dr. C. Rufus Rorem, Director, American Hospital Association, Eighteen East Division Street, Chicago, Illinois.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,  
Melbourne,  
March 11, 1940.

#### Naval, Military and Air Force.

##### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 45, of March 7, 1940.

##### THE SECOND AUSTRALIAN IMPERIAL FORCE.

###### Sixth Division and Ancillary Troops.

###### Australian Army Medical Corps.

Colonel Sir T. P. Dunhill, K.C.V.O., C.M.G., Retired List, and to be employed as Consulting Surgeon (part time) with salary at the rate of £400 per annum including all allowances except travelling, 1st January, 1940.

To be Major—Honorary Captain D. B. Loudon, Reserve of Officers (A.A.M.C.), 2nd Military District, and to command the 2nd/3rd Australian Special Hospital, 1st February, 1940.

To be Captains—Honorary Captain R. B. Perrins, Reserve of Officers (A.A.M.C.), 3rd Military District, and Alan Godfrey Gordon Carter, 12th February, 1940.

###### AUSTRALIAN MILITARY FORCES.

###### NORTHERN COMMAND.

###### First Military District.

###### Australian Army Medical Corps.

*Dental Service*.—Honorary Lieutenant J. W. Fleming is appointed from the Reserve of Officers (A.A.M.C.) and to be Lieutenant (provisionally), 12th October, 1939.

###### Australian Army Medical Corps Reserve.

To be Honorary Captains—Henry Bernard Hase, 20th January, 1940, Meredith Gordon Francis Donnan, 3rd February, 1940, and Dudley Clarence Williams, 6th February, 1940. To be Honorary Lieutenants—Allan Garton McKie, 20th January, 1940; John Henry Taliessyn Culverhouse, George Vincent Perry Beresford and George Ferguson Scott, 25th January, 1940.

The resignation of Honorary Lieutenant H. L. McComb of his commission is accepted.

###### EASTERN COMMAND.

###### Second Military District.

###### Australian Army Medical Corps.

Major A. W. Morrow is appointed to command the 14th Field Ambulance and is granted the rank of Temporary Lieutenant-Colonel, 22nd December, 1939. Major C. J. B. Armstrong is transferred to the Reserve of Officers (A.A.M.C.), 6th February, 1940.

Honorary Captain D. B. Loudon is appointed from the Reserve of Officers (A.A.M.C.), and to be Captain (provisionally), 31st January, 1940.

*Australian Army Medical Corps Reserve.*

Major H. O. Lethbridge, M.B.E., and Captains S. M. Ware, D. Christie and G. A. Brookes are placed upon the Retired List with permission to retain their ranks and wear the prescribed uniform. Honorary Lieutenants L. G. Stockwell and H. R. Greenwell are retired.

**SOUTHERN COMMAND.****Third Military District.***Australian Army Medical Corps.*

Major W. H. Ward is appointed to command the 10th Field Ambulance, 10th January, 1940, *vice* Lieutenant-Colonel H. G. Furnell, seconded to the 2nd A.I.F. Captains (provisionally) B. L. Hellings and T. E. Lowe are brought on to authorized establishment, 1st January, 1940. Honorary Captain A. B. Hewitt is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), 9th February, 1940. Captain J. F. Connell is transferred from the Australian Army Medical Corps, 6th Military District, with regimental seniority next after Captain M. O. Kent-Hughes, 1st February, 1940. The resignation of Captain (provisionally) S. G. Preston of his commission is accepted, 18th September, 1939. (In lieu of notification respecting this officer which appeared in Executive Minute No. 311/1939, promulgated in *Commonwealth Gazette*, No. 94, of 5th October, 1939.)

Major D. Yoffa is appointed from the Reserve of Officers (A.A.M.C.), 4th Military District, 19th February, 1940; Captain N. McLeod is appointed from the Reserve of Officers (A.A.M.C.), 2nd February, 1940.

*Australian Army Medical Corps Reserve.*

*To be Honorary Captains*—John Bunstall Turner, Dudley Munster Seely, Geoffrey Frederick Beck and John Fairfield Park, 9th February, 1940.

*To be Honorary Captains*—Ernest John Livock, Arthur Coppin and David Edwards Davies, 23rd January, 1940; Kenneth Frederick Skues and Lyal Longhurst Lovett, 16th February, 1940.

**Fourth Military District.***Australian Army Medical Corps Reserve.*

*To be Honorary Captain*—Keith Viner Smith, 17th January, 1940.

*To be Honorary Captain*—Frank John Fenner, 2nd February, 1940.

**Sixth Military District.***Australian Army Medical Corps.*

*To be Majors (temporarily)*—Captains M. G. Edison and R. J. D. Turnbull, 26th January, 1940. *Dental Service*—Honorary Lieutenant R. O. Lyons is appointed from the Reserve of Officers (A.A.M.C.), and to be Lieutenant (provisionally), 1st January, 1940.

**ROYAL AUSTRALIAN AIR FORCE.****Citizen Air Force.***Medical Branch.*

The following are granted commissions on probation with the rank of Flight Lieutenant with effect from 19th February, 1940: Arthur Wilmot Raymond, M.B., Ch.M., John Charles Fulton, O.B.E., M.B., B.S., William Anthony Seldon, M.B., B.S., and James Manning Rainbow, M.B., Ch.M.

**Reserve.***Medical Branch.*

Alan Thomas Roberts, M.B., Ch.M., F.R.C.S. (Edinburgh), is granted a commission on probation as Flight Lieutenant (Honorary Squadron Leader), with effect from 19th February, 1940. The following are granted commissions on probation with the rank of Flight Lieutenant with effect from 19th February, 1940: Herbert Malcolm Franklands, M.B., B.S., D.T.M., and William Wilson Ingram, M.C., M.D., F.R.A.C.P.—(Ex. Min. No. 13—Approved 6th March, 1940.)

**University Intelligence.****THE UNIVERSITY OF SYDNEY.**

A MEETING of the Senate of the University of Sydney was held on March 4, 1940.

**Diploma in Social Work.**

The Senate has constituted a Board of Studies of Social Work to draw up curricula to be followed by students who desire to take up courses and training in social work with a view to obtaining a diploma. The personnel of the board is: Professor R. C. Mills, Professor F. A. Bland, Professor H. T. Lovell, Professor A. K. Stout, Professor Harvey Sutton, Dr. Grace Cuthbert, Miss Helen Rees, Miss Margaret Telfer, Mrs. M. Tennyson Woods, Dr. G. E. Phillips, Mr. E. W. Hogan, Mr. G. D. Martin, Mrs. B. Muscio, with power to add two additional members.

**Appointments.**

Dr. A. J. Collins has been appointed Lecturer in Clinical Medicine at Royal Prince Alfred Hospital, in place of Dr. Allan Walker, who is at present abroad with the Second Australian Imperial Force.

Mr. H. M. Green, B.A., LL.B., has been appointed to the Lectureship in Australian Literature for the year 1940. Mr. Green is well known as the librarian of the Fisher Library and as an authority on Australian literature. He will deliver ten lectures to students attending English classes in the Faculty of Arts.

To the Lectureship in Veterinary Medicine the Senate has appointed Mr. P. L. Bazeley, B.V.Sc., who graduated with honours in the Faculty of Veterinary Science in 1938. He will take up his duties on May 1, 1940.

Dr. W. E. Fisher and Dr. W. L. Calov have been appointed Tutors in Medicine at Sydney Hospital.

Dr. R. J. Malcolm and Dr. A. P. Findlay have been appointed Tutors in Surgery at Sydney Hospital.

Dr. R. Mackey has been appointed to the Junior Lectureship in Pathology.

Mr. B. Ritchie has been appointed Demonstrator in Organic Chemistry.

The Senate has received with regret the resignation of Professor A. Mackie from the Chair of Education. Professor Mackie will retire from the position of principal of the Teachers' College this month. The Senate has placed on record an expression of appreciation for the services rendered by Professor Mackie during his occupancy of the chair.

**Veterinary Science Curriculum.**

The Senate has adopted a report submitted by the Faculty of Veterinary Science, having reference to the acceleration of the fourth and fifth years' curricula. Since, in consequence of the introduction of the five-year curriculum, no student could graduate until December, 1941, under the existing time-table the accelerated plan will enable students who pass their third-year examinations by March, 1940, to pass their final examination in June, 1941, instead of December, 1941.

**Science Research Scholarship.**

A Science Research Scholarship has been awarded to Miss Joan M. Crockford. Miss Crockford will graduate this year with first-class honours and the University Medal in Palaeontology. The scholarship is tenable for one year.

**Notice.****THE STAWELL ORATION.**

Dr. A. E. Rowden White, Chairman of the Stawell Oration Committee, announces that Dr. A. L. Kenny will deliver the seventh Stawell Oration at Melbourne on October 2, 1940. The subject chosen is "Our Eyes".

## Obituary.

WILLIAM JOHN RUSSELL.

WE regret to announce the death of Dr. William John Russell, which occurred on March 13, 1940, at Sydney, New South Wales.

## Nominations and Elections.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

McMahon, Leo Hanney, M.B., 1939 (Univ. Sydney), Saint Margaret's Hospital, Bourke Street, Darlinghurst.

The undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Boscence, William Edward Bruce, M.B., B.S., 1937 (Univ. Adelaide), Box 18, South Broken Hill. Carroll, Edward George, M.B., B.S., 1939 (Univ. Sydney), Central Court, 1, Central Street, Narembeen.

McDowall, Jean, M.B., B.S., 1938 (Univ. Sydney), "Buringa", Trentins Road, Turramurra.

Prentice, Derek Joseph Pearson, M.B., 1939 (Univ. Sydney), "Woodford", Holdsworth Avenue, Wollstonecraft.

Smith, Frank Dudley, M.B., B.S., 1933 (Univ. Sydney), F.R.C.S. (Edinburgh), 1939, 14, Kite Street, Orange.

Wightman, Denis Brian, M.B., 1939 (Univ. Sydney), Tamworth Base Hospital, Tamworth.

The undermentioned have been elected members of the South Australian Branch of the British Medical Association:

Miller, Ian Lindermann, M.B., B.S., 1938 (Univ. Adelaide), 38, Croydon Road, Keswick.

Gild, David, M.B., B.S., 1938 (Univ. Adelaide), 142, Henley Beach Road, Torrensfield.

Thompson, John Robert, M.B., B.S., 1938 (Univ. Adelaide), Port Augusta.

Elix, Robert Hugo, M.B., B.S., 1938 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

## Diary for the Month.

MAR. 26.—New South Wales Branch, B.M.A.: Council (Quarterly).  
 MAR. 27.—Victorian Branch, B.M.A.: Council.  
 MAR. 28.—New South Wales Branch, B.M.A.: Annual Meeting.  
 MAR. 29.—South Australian Branch, B.M.A.: Branch.  
 MAR. 29.—Queensland Branch, B.M.A.: Council.  
 APR. 2.—New South Wales Branch, B.M.A.: Council.  
 APR. 3.—Victorian Branch, B.M.A.: Branch.  
 APR. 3.—Western Australian Branch, B.M.A.: Council.  
 APR. 4.—South Australian Branch, B.M.A.: Council.  
 APR. 5.—Queensland Branch, B.M.A.: Branch.  
 APR. 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee; Organization and Science Committee.  
 APR. 9.—Tasmanian Branch, B.M.A.: Branch.  
 APR. 12.—Queensland Branch, B.M.A.: Council.  
 APR. 16.—New South Wales Branch, B.M.A.: Ethics Committee.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xvi-xviii.

AYR HOSPITALS BOARD, AYR, QUEENSLAND: Junior Medical Officer.

ROYAL AUSTRALIAN AIR FORCE: Medical Officers.

## Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	Associated Medical Services Limited. All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Federated Mutual Medical Benefit Society. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	Wiluna Hospital. All Contract Practice Appointments in Western Australia.

## Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2851-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and book-sellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad per annum payable in advance.